plating

JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

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Tentative Program—AES 48th Annual Convention

PLATING MAGAZINE

AMERICAN ELECTROPLATERS SOCIETY

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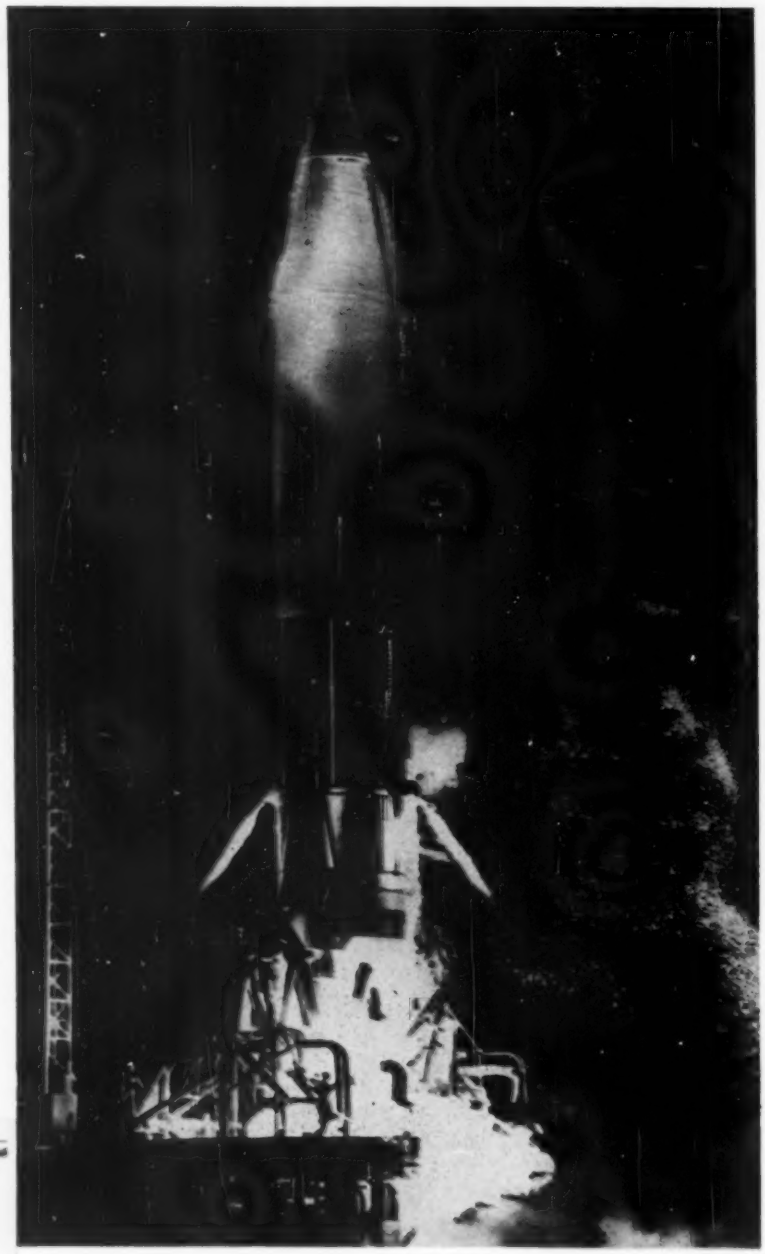

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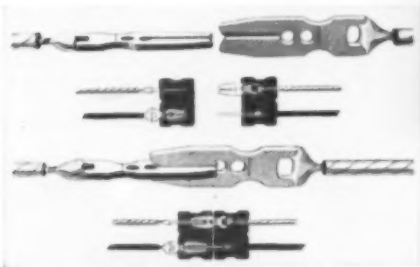

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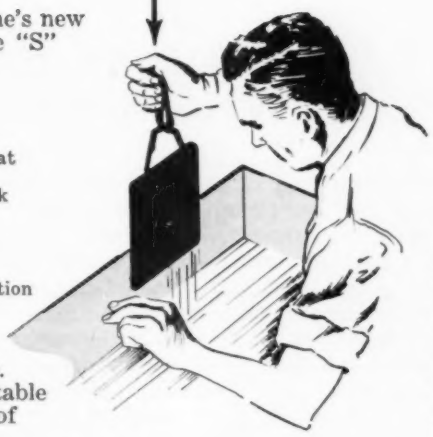

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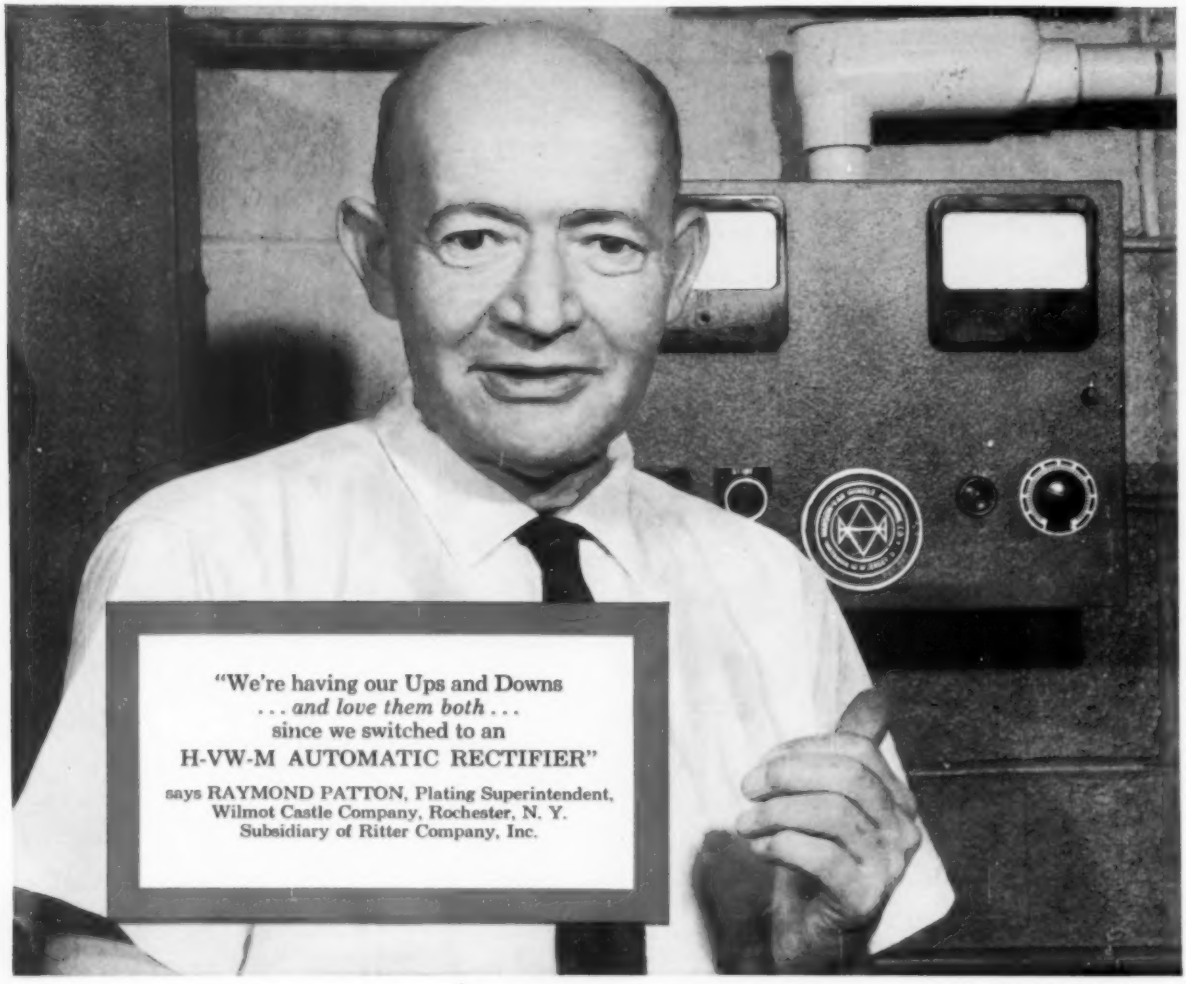
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JOURNAL OF THE AMERICAN ELECTROPLATERS' SOCIETY

FEBRUARY 1961 — AUDITED PAID CIRCULATION — **Vol. 48, No. 2**

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Published by American Electroplaters' Society, Inc. (AES), American Building, 443-445 Broad Street Newark 2, New Jersey. Phone HUmboldt 2-3400.

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EDITORIAL

SHARING KNOWLEDGE

WEBSTER INFORMS US that "sharing" can be taken as "using together," "enjoying together" or "having in common." When these meanings are applied to Knowledge, we can readily see why our sciences and technologies have advanced to the high levels that they enjoy today.

Our history books tell how the sages of old would gather about them, the promising and ambitious young men of their communities and not only didactically lecture to them, but also discuss with them, the scientific problems and developments of their day. In this way, the Knowledge of the past, blended with the new, was orally conveyed to upcoming generations. The "Schools" of Socrates, Plato, Archimedes and others were run thusly before the birth of Christ.

With the invention of the "Gutenberg Press" by J. Gutenberg in 1450 and the "Gordon Cylinder Press" by George P. Gordon in 1850, it became possible to expose the writings of the learned on a broader scale thus enabling a far larger number of students to share the Knowledge radiated by the works of the masters. Hence, as the printed word spread over the world, so too did Knowledge spread and shed light upon ever-wider areas of the Arts and Sciences, thus stimulating ever-greater progress.

Today, through perfected aural and visual means and media, we are projecting and sharing Knowledge on an unprecedented scale, hindered, as to latitude, only by the language barrier. Today, by sharing Knowledge, we are consequently enjoying an advanced level of intelligence, and history's highest standard of living.

American Electroplaters' Society's objective, namely ". . . the improvement and dissemination of the knowledge of the arts and sciences of electroplating and the finishing of metals and allied arts, the development of a cooperative spirit of friendship and mutual assistance among its members . . ." and the Society's unswerving application thereof, employs both methods of sharing Knowledge.

At its monthly Branch meetings, at its Regional Meetings, at its Annual Meetings and Conventions, AES utilizes the oral and personal contact method of sharing Knowledge as was practiced by the Ancients—by Socrates, Plato and other such renowned mentors.

By publishing worthy technical intelligence in diverse forms, including technical articles in PLATING MAGAZINE and TECHNICAL PROCEEDINGS, the Society also lavishly employs the printed word so that all of its members, wherever they may live, can share in the special Knowledge of others.

The "Good Book" states that "It is more blessed to give than to receive"! When you practice this in your AES membership by presenting papers at AES meetings, by participating in technical discussions, or by publishing your technical knowledge in PLATING or in TECHNICAL PROCEEDINGS, you will, of course, be blessed in "giving." But you will, in turn, also "receive." Inescapably, one "gives" yet "receives" when one SHARES KNOWLEDGE.

Ralph D. Wysong

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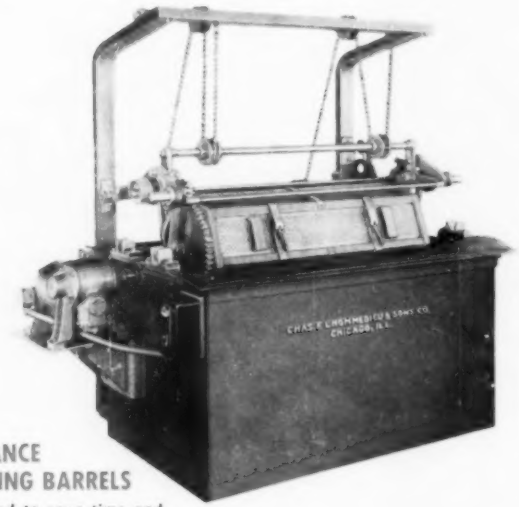

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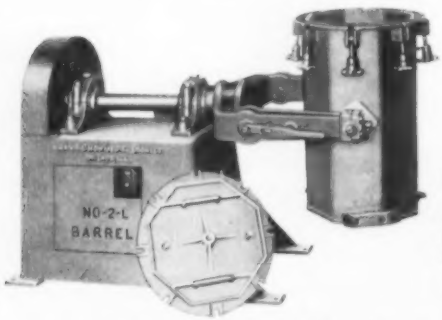

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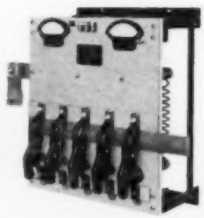

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As members of half-century old American Electroplaters' Society, Inc. (AES) their annual subscriptions to AES's half-century old PLATING MAGAZINE are included in their AES annual dues. Moreover, a large and growing international number of AES non-members interested in educational enrichment, spontaneously subscribe yearly to PLATING, and renew their subscriptions year-after-year. It is revealing that not only does PLATING enjoy the largest audited PAID circulation in this field but also the highest audited percentage of PAID subscription renewals.

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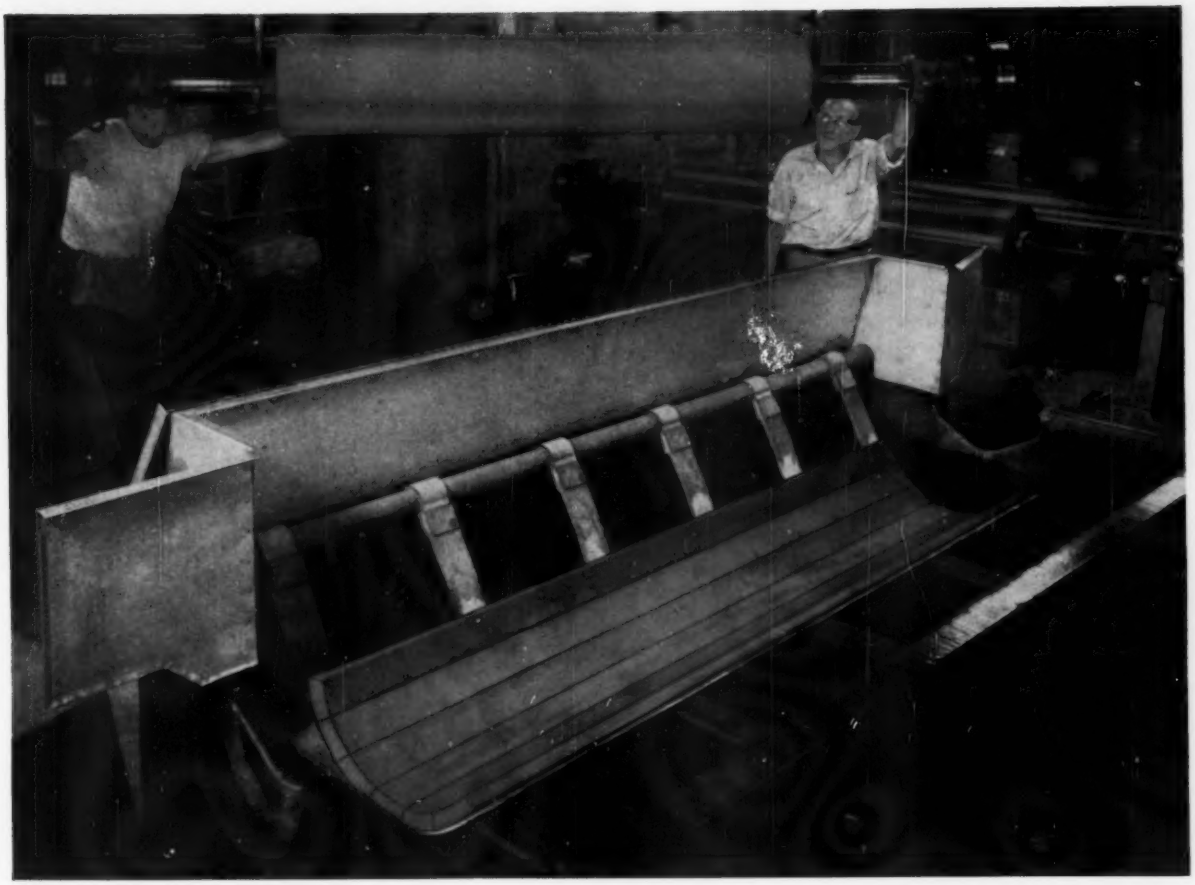

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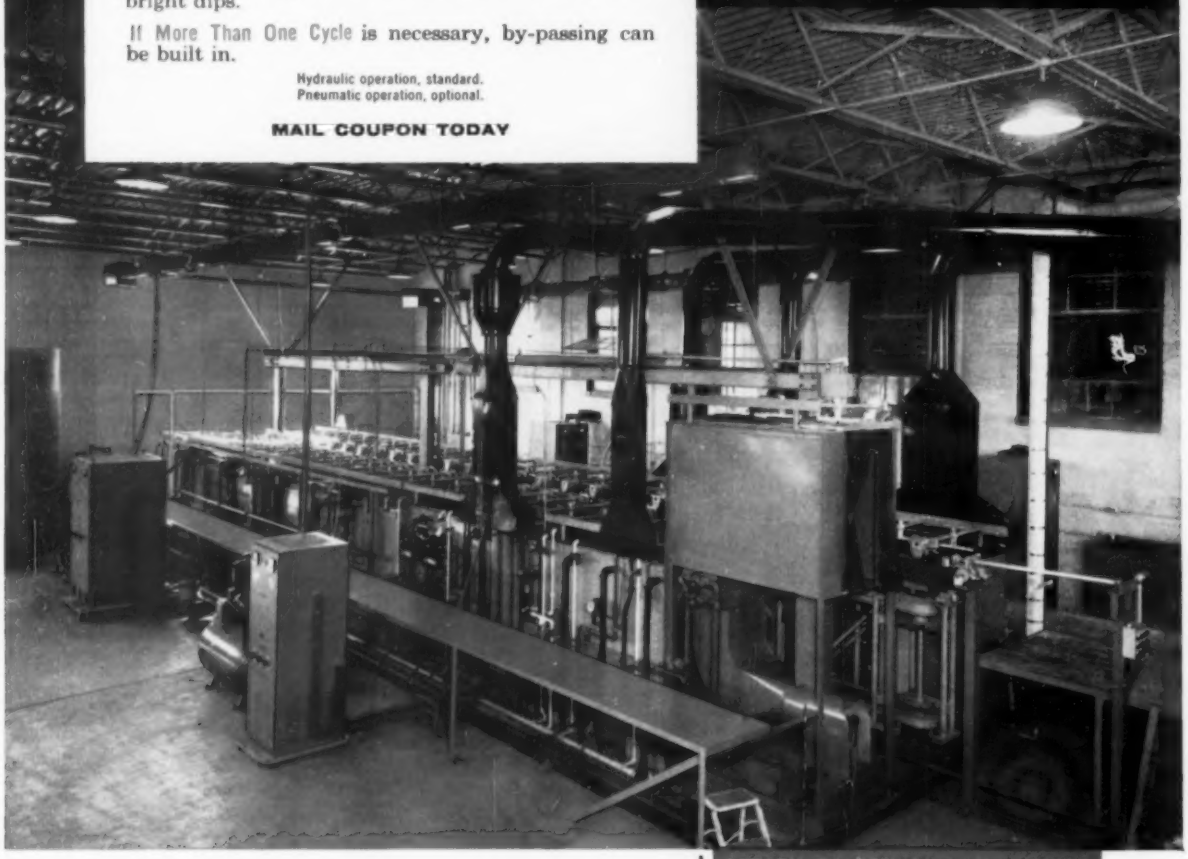

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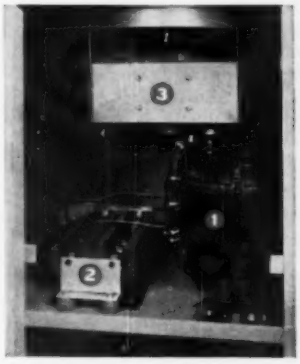

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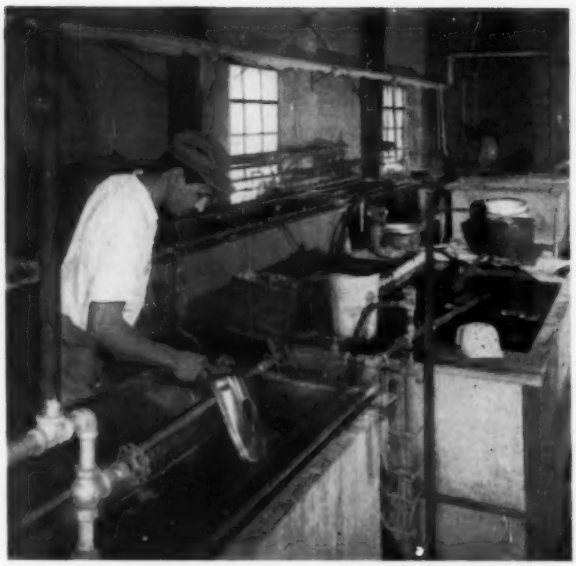

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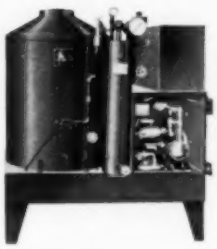

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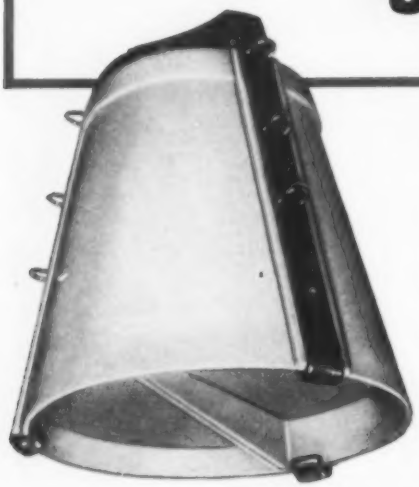

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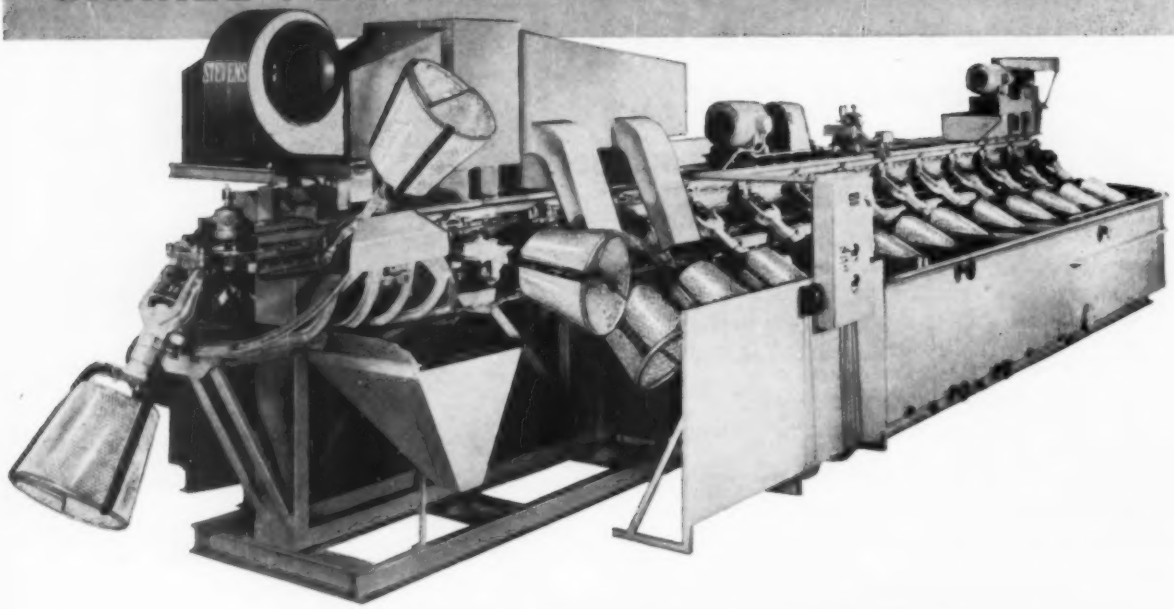

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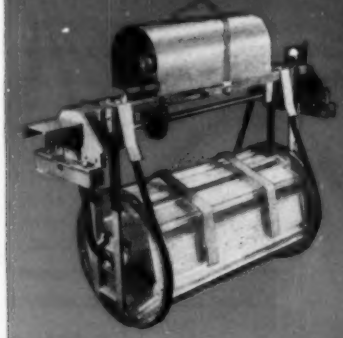

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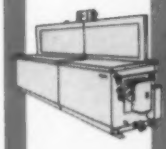

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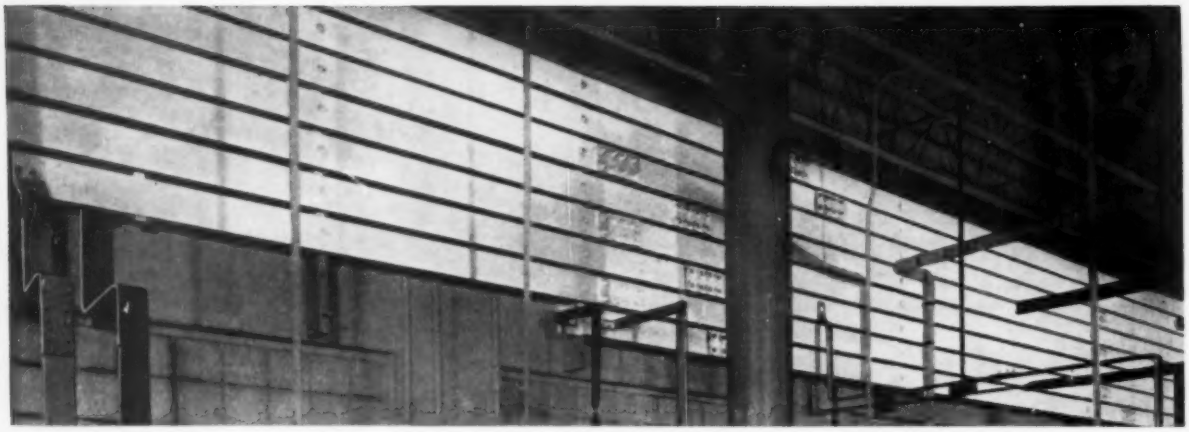

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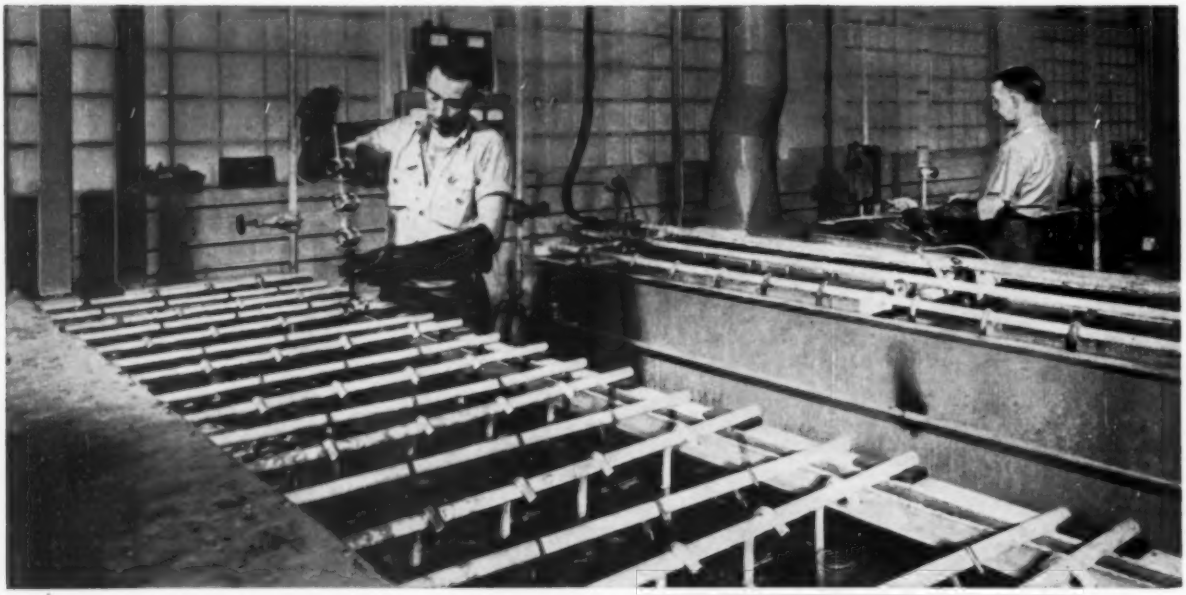

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ACCLAIMED 1960 EDITION, "TECHNICAL PROCEEDINGS" AWAITING YOUR ORDER

THE INTERNATIONALLY awaited 1960 Edition of the annual book, TECHNICAL PROCEEDINGS, of American Electroplaters' Society, Inc. (AES), published in record time, has now made its appearance, and copies thereof have already been issued to AES members in good standing far and wide, here and abroad, for whom the annual book is principally intended. And having accommodated its farflung membership with free copies, AES, the book's exclusive publisher, now has a limited quantity of extra copies available for sale to AES non-members, on strictly a "first come-first served" basis so long as that limited supply lasts, so as to share the book's educational benefits.

Comparable in quality to the GOLDEN JUBILEE EDITION of TECHNICAL PROCEEDINGS (1959 Edition) that earned worldwide acclamation in technical, scientific and other educational circles, AES's 1960 Edition, another treasure chest of knowledge on electroplating, metal finishing, organic coating and allied arts, contains the full text of each of the 31 papers delivered by experts before the 47th Annual Convention of American Electroplaters' Society, Inc., held in Los Angeles, California, July 24-28, 1960.

Embodying, too, the charts, diagrams, graphs, tables and other illustrations of each of the 31 published papers, the book also includes the transcript of the discussion that attended the delivery of each paper. A full list of the papers published in this voluminous repository of education appears on the opposite page of this announcement.

The unique book also includes, among other data, a day-to-day log of the Convention; a section on the AES Scientific Achievement Award and on other AES technical and scientific awards and honors bestowed at that first West Coast National AES Convention; a full listing of the Boards and Standing and Special Committees that served the AES during its fifty-first year, and a complete AES Branch Directory.

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A limited but fast dwindling extra quantity of the 1960 book has, as stated, been printed to meet the sizable interest shown in it by AES non-members internationally. Orders for copies of the book are now consequently invited from AES non-members, and will be accepted on strictly a "first come-first served" basis so long as that extra supply lasts. The book is unavailable for purchase elsewhere.

Within the continental limits of the United States, the domestic price of this 1960 Edition of AES's TECHNICAL PROCEEDINGS is $18 per copy including postage.

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THE WELLSPRING OF THESE IMPORTANT PAPERS

As a dramatic and fitting climax of its 51st fiscal year, American Electroplaters' Society, Inc. (AES) conducted its outstanding 47th Annual Convention, first West of St. Louis, at the Statler-Hilton Hotel, Los Angeles, California, July 24-28, 1960, with the dynamic Los Angeles Branch, its West Coast pioneer, as Host Branch.

♦

The AES was welcomed to California and Los Angeles by Governor Edmund G. Brown and by Mayor Norris Poulson. The entire week of the AES's Convention was, in fact, proclaimed by Los Angeles's Mayor as "American Electroplaters' Society Week in Los Angeles."

♦

Educational Sessions numbered nine. Experts presented 31 technical and scientific papers enriching knowledge in electroplating, metal finishing and allied arts. One Session alone covered organic finishing.

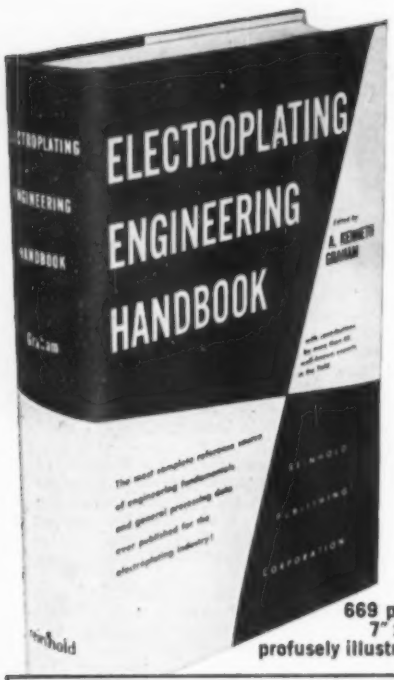
High spots of the Sessions were not only the second annual "William Blum Lecture" that was delivered as the Educational Program's lead-off attraction by Dr. A. Kenneth Graham, 1959 winner of the "AES Scientific Achievement Award", the Society's highest scientific honor, but also the vaunted two-session, eight-paper "Hydrogen Embrittlement in Metal Finishing Symposium." In addition, this Convention also featured the summary of AES Research Projects presented by AES Research Committee Chairman James D. Thomas at one of the Sessions.

♦

Under the active planning and supervision of the AES's Editorial Board itself, the Educational Sessions were programmed for the AES by Host Branch Educational Chairman Earl W. Arnold and his Co-Chairman, David F. Seymour, with Dr. Harold J. Read of Pennsylvania State University, a special member of that Los Angeles Branch Committee, responsible for the "Hydrogen Embrittlement in Metal Finishing Symposium."

OPENING EDUCATIONAL SESSION HEARS 1960 "WILLIAM BLUM LECTURE"

(1) Dr. William Blum introducing Dr. A. Kenneth Graham, deliverer of the 1960 "William Blum Lecture." (2) Attentive audience hears Dr. Graham discuss "Faraday's Laws Applied to Cleaning." (3) Dr. Graham holds "AES Scientific Achievement Award" scroll presented to him by National President Ralph D. Wysong, right, in behalf of American Electroplaters' Society, Inc.



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Here are a few excerpts from a review in *Research and Engineering:* "The book is very well written, remarkably free from typographical errors, and shows an excellent appreciation of the problems encountered by the practitioner in the selection of tables and topics covered . . . much attention is paid to definition of all terms used, and it appears that special attention must have been directed toward making each presentation easy to understand . . . The editor and his associates are to be complimented on a fine job, resulting in a volume which may be recommended to all who are associated with the engineering aspects of electroplating."

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"WE HAVE a record in this part of the U. S. Department of Commerce, of some 5000 National Association and Societies. Your volume is one of the finest reports of its type which we have had the pleasure of seeing prepared by an Association." Thus did one agency evaluate the Golden Jubilee Edition of the book TECHNICAL PROCEEDINGS (1959) of American Electroplaters' Society, Inc. (AES), its exclusive publisher. AES has a limited number of extra copies available for sale to AES non-members and others so as to share the book's educational benefits.

The unique book contains the full text of each of the 43 technical papers on electroplating, metal finishing, organic coating and allied arts by experts of nine countries, including the United States, England, Canada, Australia, France, Germany, Holland, India and Italy, delivered before the Fifth International Conference on Electrodeposition and Metal Finishing, educational sessions element of the AES's Golden Jubilee Convention held in Detroit, Michigan, June 15–19, 1959.

Embodying, too, the charts, diagrams graphs, tables and other illustrations of each of the 43 published papers, *the book also includes the transcript of the discussion that attended the delivery of each paper.* A full list of the papers published in this voluminous treasure chest of knowledge has been carried in past issues of PLATING MAGAZINE since December 1959, and will gladly be sent to you on request.

Spanning some 400 pages (by far the largest annual TECHNICAL PROCEEDINGS ever published by the AES in its half-century lifetime), this 1959 edition also includes, among other data, a day-to-day log of the Golden Jubilee Convention; a section on the AES Scientific Achievement Award and on other AES technical and scientific awards and honors bestowed at the Golden Jubilee Convention; a full listing of the Boards and Standing and Special Committees that served the AES during its Fiftieth Anniversary year, and a complete AES Branch Directory.

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INTERNATIONAL CONFERENCE: ITS AES HALF-CENTURY SETTING

DRAMATIC and fitting climax of its year-long FIFTIETH ANNIVERSARY observance, American Electroplaters' Society, Inc. (AES) conducted its unique Golden Jubilee Convention and Industrial Finishing Exposition, including the concurrent Fifth International Conference on Electrodeposition and Metal Finishing, in Detroit, Michigan, June 15-19, 1959.

GREETED by the President of the United States, the AES was welcomed to Michigan and Detroit by Governor G. Mennen Williams. The entire week of the AES's Convention, Exposition and International Conference was proclaimed by Detroit's Mayor as "AES GOLDEN JUBILEE WEEK IN DETROIT."

AS the Fifth International Conference on Electrodeposition and Metal Finishing, the Golden Jubilee Convention's educational sessions numbered eleven. Experts from nine countries, including the United States, England, Canada, Australia, France, Germany, Holland, India and Italy, presented 43 technical and scientific papers enriching knowledge in electroplating, metal finishing and allied arts. High spot of the sessions was the first "William Blum Lecture" that was delivered by the eminent Dr. William Blum, first winner of the AES Scientific Achievement Award, the Society's highest honor.

UNDER the supervision of the AES's Editorial Board, in collaboration with the International Council on Electrodeposition and Metal Finishing, the International Conference was planned for the AES by AES Past President Walter L. Pinner, Chairman of the International Council. His Committee included Dr. T. P. Hoar, Dr. Simon Wernick, A. W. Wallbank, R. A. F. Hammond and George Gardam of England and Myron B. Diggin, Dr. Walter R. Meyer and Dr. Richard B. Saltonstall of the United States.

OPENING SESSION OF THE FIFTH INTERNATIONAL CONFERENCE ON ELECTRODEPOSITION AND METAL FINISHING

(1) Chairman Walter L. Pinner extending official welcome. Dr. William Blum, AES Scientific Award winner, seated. (2) Crowded auditorium at the first session. (3) Session Chairman T. P. Hoar introducing Dr. Blum, who delivered the first William Blum Lecture.

CONTENTS, 1958 EDITION

The Role of the Basis Metal in the Production of Stressed Electrodeposits by *Dr. Joseph B. Kushner*, Kushner Electroplating School

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AES Project No. 14—The Influence of Physical Metallurgy and Mechanical Processing of the Basis Metal on Electroplating
V: Effect of Polishing on the Durability of Nickel Plated Mild Steel by *Dr. Maurice H. Jones and J. Zajdowski*, Ontario Research Foundation

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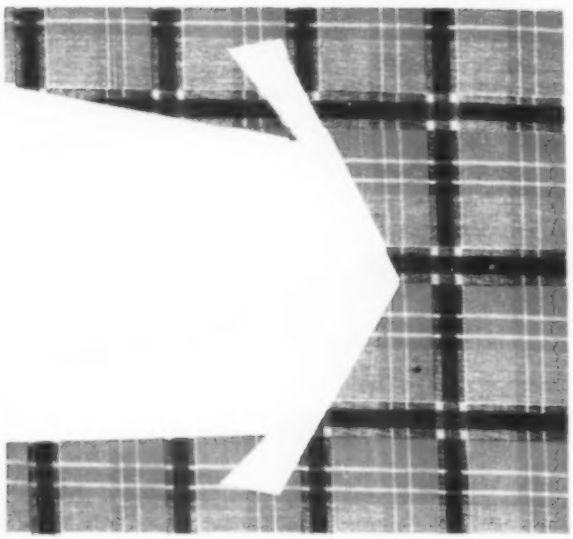

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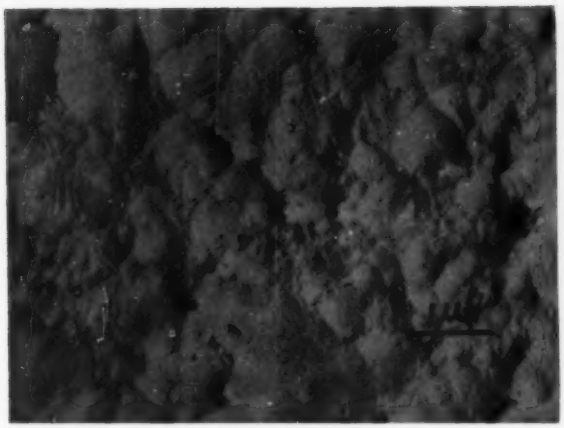

Fig. 1. Negative parlodion replica of Sample 3018, as plated.

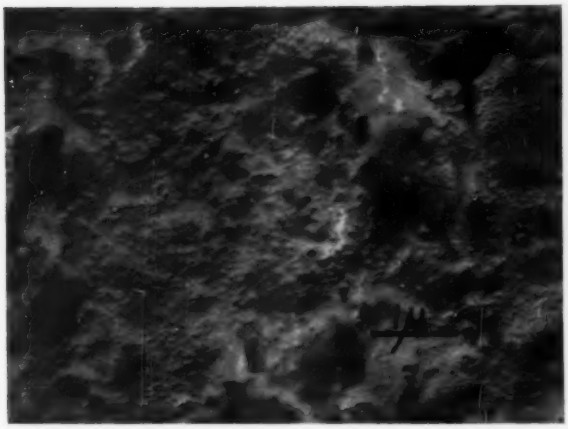

Fig. 2. Negative parlodion replica of Sample 3020 after three-month exposure.

AN ELECTRON-MICROSCOPIC STUDY OF THE CORROSION OF ELECTROPLATED NICKEL

by **ROLF WEIL***

ABSTRACT

The structural changes occurring in electroplated nickel exposed to outdoor corrosion were determined by electron microscopy. It was found that the structures of all deposits became similar after a one-year exposure regardless of the as-plated appearance. The formation of pits which reached to the basis metal was accelerated by the addition of sulfur-containing agents to the plating bath. Pitting as observed by electron microscopy could not be related to pitting seen with the unaided eye. Electron microscopy appears to be a valuable tool in the study of corrosion of electrodeposits.

INTRODUCTION

THE BEHAVIOR OF ELECTRODEPOSITS under corrosive conditions has received more attention than any other property. There are many articles in the literature describing the results of atmospheric and accelerated corrosion tests. The purpose of these experiments has been to compare and evaluate such factors as, for example, the effect of basis-metal treatment[1] or plating-bath composition.[2] In general, no attempt has been made to study the mechanism of corrosion which was occurring. There have been investigations under laboratory conditions to study the mechanism.[3] These consisted chiefly of measurements of electrochemical potentials. But as pointed out by LaQue[4] a satisfactory relationship between laboratory tests and out-door-exposure tests has not yet been found. Holló and Gube[5] recently stated that al-

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though electron microscopy has been widely used in the study of metal surfaces, it has not been extensively applied to corrosion. It is the purpose of this article to show how electron microscopy offers a means of obtaining more information from atmospheric-corrosion tests which can aid in understanding the mechanism of corrosion. As the samples examined were nickel, plated from Watts' baths containing various addition agents, results on the effect of bath compositions on corrosion are included in this study.

EXPERIMENTAL PROCEDURE

Twenty corrosion-test panels were prepared by nickel plating an area of 1 dm^2 of low carbon, hot-rolled steel sheet in Watts' baths with various addition agents. The composition of the solutions and the plating conditions are shown in Table I. Prior to plating, the steel was polished with fine emery paper, degreased with xylene and subjected to a recommended[6] preplating cycle for decorative coatings. The nickel deposits were 50 microns thick.

TABLE I

PLATING CONDITIONS AND ADDITION AGENTS†

Bath Composition: 400 g/l $NiSO_4 \times 6\ H_2O$, 45 g/l $NiCl_2 \times 6\ H_2O$, 45 g/l H_3BO_3 (0.2 g/l of sodium lauryl sulphate was added to reduce pitting).

Plating Conditions: *p*H: 4.0; temperature: 60° ± 2°C; current density: 5 amp/dm^2.

†The Addition Agents are listed on page 167.

The microstructures of the as-plated surfaces were examined in an RCA-EMB electron microscope using the negative collodion replica method described by Weil and Read.[7] The test panels were exposed to an industrial atmosphere on the roof of a seven-story building in Hoboken, N. J. on the West Bank of the Hudson River opposite New York City. The samples faced East and were inclined an angle of 37° from the horizontal. The appearance of the panels was noted periodically and photographed. After three weeks, negative collodion replicas were made of four samples, considered representative and their structure studied electron microscopically. The four panels remained in the exposure rack. After one year, all panels were removed from the rack and washed in a mild detergent solution with a soft metallographic polishing cloth. After rinsing several times and drying, each panel was photographed. As the surface structure after corrosion was too rough, the negative replica technique, previously employed, could not be used. A method similar to that described by Pohlmann[8] was substituted. This consisted of painting a 5 per cent aqueous solution of a water-soluble carboxymethyl cellulose* onto the surface to be examined and stripping the resulting film after it had dried. A drop of collodion was then allowed to run down the cellulose film. The replica was obtained by dissolving the cellulose in water. Thus, a positive replica resulted. Because the corrosion products obscured the structure in rust-containing pits and their immediate surroundings, such areas could not be examined.

*Tylose KZO, made by Kahle & Co., Wiesbaden, Germany.

RESULTS AND DISCUSSION

The microstructures of the as-plated samples as well as their light-reflecting properties, surface roughnesses and crystal orientations have been discussed previously.[9] Briefly, it was found that three fiber axes, (100), (110), and mixed (311) + (111) existed and that they were controlled by the addition agents in the plating bath. Each fiber axis corresponded to a microstructural type. A platelet structure was associated with the (100) axis, spiral-type growth with (110) and extremely fine grains with (311) + (111). There were wide variations in the platelet size and the depth and width of the grain boundaries. In some samples with the (311) + (111) fiber axis there were crevices between groups of grains. The cause of the crevices is presently under investigation.

Tiny pores about 0.1 micron in diameter were seen in many as-plated samples. Figure 1 shows a deposit where such pores are visible. It is evident that these voids occurred most frequently at the tops of the grains which protruded into the solution during plating and where others[10, 11] have found preferential adsorption and codeposition of foreign substances. Some voids may be small tears caused by the high stresses which exist in electrodeposits.

After a few weeks exposure to the atmosphere, the surfaces of the panels, especially those which were originally bright, became duller and small pits became visible to the naked eye. There was no rust seen in the pits which indicated that they did not penetrate to the steel. The electron-microscopic examination of some samples after a three-week exposure showed that the grain boundaries became wider and deeper, the number of pores and the size of some increased, and the crevices between colonies of the very fine grains tended to become a continuous network. The grain boundaries, crevices and existing pores obviously became areas of preferential corrosion. However, it was found that such defects need not be present in order for corrosion to occur. This fact is illustrated in Fig. 2 which represents the surface of a deposit which before exposure was specular and showed no crevices or pits under electron-microscopic examination.* In Fig. 2 many small pits and some crevices are visible. The black areas in this electron micrograph as well as in subsequent ones are corrosion products which adhered to the replica. The increase in the number of voids after exposure in all panels could be due to the enlargement of pores originally too small to be seen even with the electron microscope or the presence of defect sites such as impurity atoms or dislocations which acted as corrosion nuclei.

The periodic visual observation of the corrosion panels showed that after a four-month exposure all samples were equally dull. The number of pits which could be seen with the naked eye also increased with increasing exposure time. However, only after the first heavy snow, which occurred seven months after the panels were placed outside, was rust first noticed. Some panels did not show any rusty pits even after a one-year exposure. The tendency for the formation of voids which penetrated to the basis metal as indicated by the presence of rust, appeared to be related to the addition agents in the bath in which the panels were nickel plated. Panels from baths containing naphthalene disulfonic acid, p-toluene

*An electron-micrograph of the as-plated structure of this panel is Fig. 5 of Ref. 9.

sulfonamide, saccharin and the proprietary brighteners, all chemicals containing sulfur, had many rusty pits. Figure 3 is a photograph of a typical panel from a bath with addition agents containing sulfur. Panels from Watts' bath

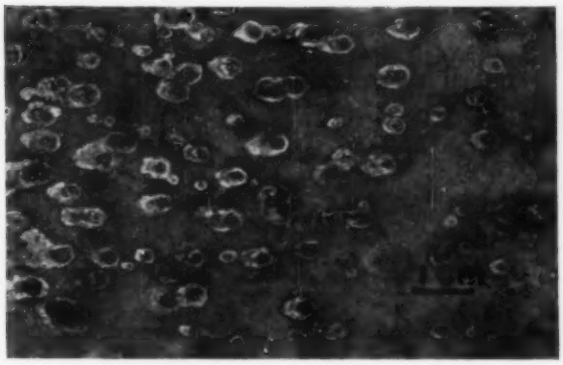

Fig. 3. Photograph of Sample 3016 after one-year exposure.

without addition agents and containing benzoic acid and aniline had no pits which bottomed on the steel. These panels were among the dullest in appearance originally. A photograph of a panel from a bath containing aniline, a sulfur-free addition agent, is shown in Fig. 4. Additions of chloral hydrate to baths containing naphthalene disulfonic acid reduced the tendency towards deep-pit formation of samples plated therein. Zinc additions were not as effective as chloral hydrate. The addition of 0.6 g/l of chloral hydrate to the solution containing p-toluene sulfonamide reduced deep-pit formation, whereas 0.2 g/l had no effect.

It appeared that there was no relationship between the dulling of the corroded panels and their as-plated microstructure. The electron-microscopic examination after a one-year exposure showed that the overall structures of all samples were similar and bore little resemblance to those in the as-plated condition. The various structural features

Fig. 4. Photograph of Sample 3014 after one-year exposure.

observed are shown in Figs. 5 to 8. Structures like those shown, were observed frequently in the same panel in different areas. As the brightness has been shown[9] to be determined by the degree to which the microstructural components are in one plane, it is evident that as the structures of all samples were very rough, all should have been equally dull. This was observed.

The microstructural changes of the panels as a result of corrosion were the formation of deep crevices and pores. It was no longer possible to distinguish between true grain boundaries and crevices which surrounded colonies of fine grains. This fact accounted for the structural similarity of the different samples. In some originally coarse-grained structures, corrosion resulted in the exposure of definite crystalline planes as shown in Fig. 5. The paper by Brüche and Pappa[12] showed similar structures in single crystals after corrosion. Pearson, Huff and Hay[13] and Edeleanu[14] showed that pits follow certain crystallographic directions, at least in the early stages of corrosion. There was no other effect of crystal orientation on corrosion behavior. Similar microstructures as well as rusty pits were found in samples regardless of whether the crystals were highly oriented or almost random.

The crevices which are rather close together and give the appearance of erosion as seen in Figs. 5 and 6 are not believed

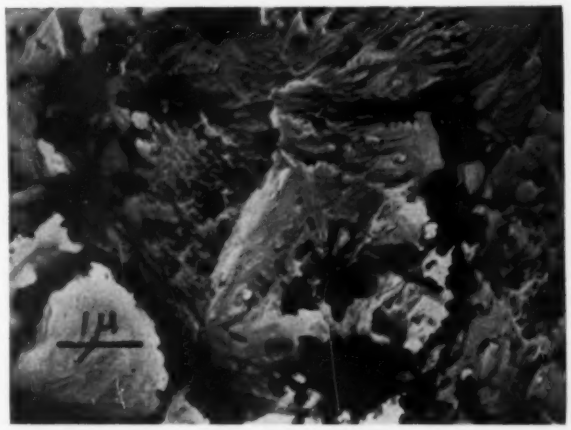

Fig. 5. Positive parlodion replica of Sample 3016 after one-year exposure.

to be a preferential corrosion along certain crystallographic directions, as they were observed often in the very fine-grained structures which were almost random in orientation. The crevices must have proceeded in these samples along certain groups of grains. It is suggested that local differences in chemical composition due to the plating conditions made certain paths more corrosion susceptible.

The porosity of the electroplated panels also appeared to be unrelated to the original microstructure. Pits which penetrated to the basis metal were observed in samples having the platelet structure as well as the fine-grained type. It is believed that the reason that there were no deep voids in samples with the spiral-type growth was that this structural type was not found in baths with addition agents containing sulfur.

It is doubtful if pores which reached the basis metal, existed in the as-plated conditions. Several investigators[15, 16] have found that such porosity decreases sharply after a plating thickness of 25 microns has been reached. The forma-

tion of the deep pits therefore must have taken place by enlargement of existing defects. It was observed that there were more relatively large pits seen by electron microscopy in the panels where the most rusty pits were visually observed. The panels from baths with sulfur-containing addition agents

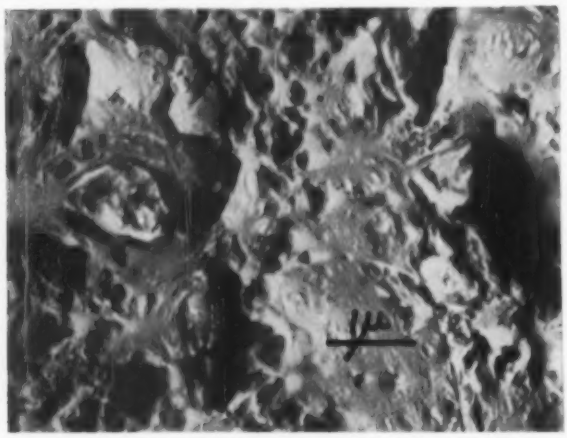

Fig. 6. Positive parlodion replica of Sample 3002 after one-year exposure.

frequently showed the type of pitting illustrated in Fig. 7. These pits appear lighter than the background and often spirals can be seen in them. Intergranular pores of the type shown in Fig. 8 were also frequently found in the originally coarser-grained deposits. It was found by Vernon[17] that sulfur in the form of SO_2 which forms the sulfate radical

Fig. 7. Positive parlodion replica of Sample 3007 after one-year exposure.

under catalytic action is the chief factor in the corrosion of nickel. The susceptibility to corrosion pitting of similar panels has been found to be greater in a sulfurous atmosphere.[4] It therefore appears that sulfur in the atmosphere and when codeposited from the addition agents in the plating bath accelerated pore enlargement. It is obvious that not all voids observed in the microstructure became deep pits. The number of the former is approximately 10^7 times greater than that of the latter. It was not possible to determine whether a particular type of pore was most susceptible to enlargement.

As pointed out in the introduction, the chief purpose of this paper was to show how electron microscopy could be used to study outdoor corrosion. Using the positive replica method previously described, it is not necessary to remove the panels from the corrosion sites. Duplicate samples could easily show whether replication affects the corrosion behavior. It is not believed that it does, as the areas where replicas were made after three weeks behaved like the rest of the panel. It is now obvious that replicas of the panels should have been examined electron microscopically at more frequent intervals in order to follow the corrosion phenomena. It is hoped that such a study can be undertaken in the near future.

CONCLUSIONS

It appeared that the nature of the addition agent to the plating bath had the greatest influence on the susceptibility of nickel electrodeposits to form deep pores under exposure to

Fig. 8. Positive parlodion replica of Sample 3018 after one-year exposure.

certain corrosive conditions. Neither the microstructure nor the brightness of deposits had a significant effect. In addition to the formation of porosity, the surface of all the corroded panels became dull as a result of the development of roughness in the microstructure. The structure of the deposits after exposure as seen with the electron microscope consisted of crevices, some of which were actual grain boundaries and other surrounded colonies of fine grains. The structure of all samples after a one-year exposure were therefore similar regardless of the original appearance. There were numerous pits of various sizes seen. But it was not possible to relate directly pitting as observed by electron microscopy to that seen with the naked eye. It appeared that the growth of the pits was accelerated by the presence of sulfur when co-

deposited and when present in the atmosphere. Electron microscopy was a valuable aid in the study of corrosion phenomena.

ACKNOWLEDGMENTS

Mr. R. A. Paquin prepared the panels and Mr. L. Gardella assisted in the photography. Messrs B. B. Knapp, C. H. Sample and D. B. Croly of The International Nickel Company, Inc. read the manuscript and made valuable suggestions. The work was sponsored by the Office of Ordnance Research, U. S. Army.

Spec. No.	Addition Agent (See Table I)
3000	None
3001	0.2 g/l 1-5 Naphthalene Disulfonic Acid
3002	0.4 g/l 1-5 Naphthalene Disulfonic Acid
3003	0.6 g/l 1-5 Naphthalene Disulfonic Acid
3004	0.6 g/l 1-5 Naphthalene Disulfonic Acid, 0.2 g/l Chloral Hydrate
3005	0.6 g/l 1-5 Naphthalene Disulfonic Acid, 0.6 g/l Chloral Hydrate
3006	1.0 g/l 1-5 Naphthalene Disulfonic Acid, 0.6 g/l Chloral Hydrate
3007	0.2 g/l p-Toluene Sulfonamide
3008	0.6 g/l p-Toluene Sulfonamide
3009	0.6 g/l p-Toluene Sulfonamide, 0.2 g/l Chloral Hydrate
3010	0.6 g/l p-Toluene Sulfonamide, 0.6 g/l Chloral Hydrate
3011	1.0 g/l Zinc, 0.6 g/l 1-5 Naphthalene Disulfonic Acid
3012	1.0 g/l Zinc, 1.0 g/l 1-5 Naphthalene Disulfonic Acid
3013	0.09 g/l Aniline
3014	0.18 g/l Aniline
3015	0.31 g/l Benzoic Acid
3016	0.08 g/l Saccharin
3017	0.20 g/l Saccharin
3018	0.40 g/l Saccharin
3019	0.60 g/l Saccharin
3020	Propietary Addition Agents

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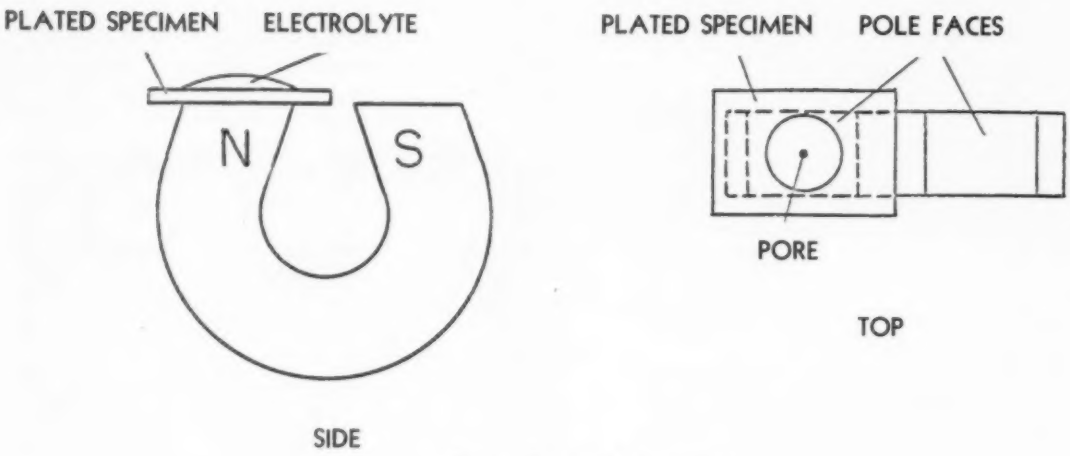

Fig. 1. Experimental arrangement.

AES RESEARCH PROJECT NO. 13

THE NATURE, CAUSE AND EFFECT OF THE POROSITY IN ELECTRODEPOSITS

VI. NOTE ON A MAGNETIC METHOD OF DETECTING CORROSION CURRENTS

by FIELDING OGBURN* and WILLIAM H. ROBERTS**

ABSTRACT

An experiment is described which demonstrates a magnetic method of detecting the electric current of a galvanic cell. The galvanic cell is placed in a magnetic field. Interaction of the moving electric charges with the magnetic field results in motion of the electrolyte.

CORROSION CURRENTS of galvanic cells can be detected by observing the motion of the electrolyte in a magnetic field. This novel method is illustrated by the following simple experiment.

A nickel-plated steel panel was obtained which had been immersed in tap water long enough to develop several rust spots. The loose rust was removed, and the panel was placed on the flat pole face of a strong magnet (1700 gauss close to either pole face) with a rust spot in the center of the magnetic field (Fig. 1). The pit and surrounding area were covered with a dilute solution of sulfuric acid (*p*H about 1) containing

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suspended particles of activated carbon to facilitate detection of movement of the liquid. With the specimen over the north pole of the magnet, the solution rotated clockwise around the pit over a circular area about 2 cm (3/4 inch) in diameter. The rotation was counterclockwise when the specimen was over the south pole.

The circular motion is a direct result of the interaction of the electrical current flowing radially from the pit and the magnetic field (Fig. 2). The rate of motion depends in part

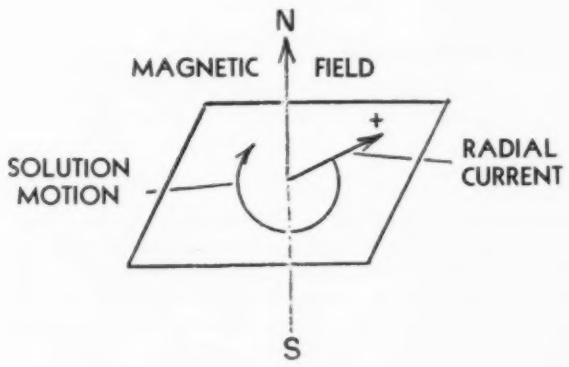

Fig. 2. Directional relationships: magnetic field, current flow, and solution motion.

on the magnitude of the current and the direction of motion depends on the direction of current flow. In this particular experiment, the observations indicate the nickel is the cathode. The mathematical expression which describes the electrodynamic forces involved is the vector equation:

$$F = e\left(E + \frac{1}{c} V \times H\right)^*$$

The optimum conditions and techniques for obtaining maximum sensitivity have not been determined, but the authors did repeat the experiment with various modifications. For example, other electrolytes such as a 5-per cent sodium chloride solution and couples of metals such as nickel-steel, chromium-steel, and chromium-copper were used. No currents were detected with chromium-nickel couples. Also, it was found helpful to observe the motion of the carbon particles at about 30-fold magnification.

A supplementary experiment indicated that currents as small as 10 microamperes could be detected by this means. For this experiment, a cell simulating the one described earlier was constructed in such a way that the anode and cathode were not in direct contact. Known currents were then passed between the electrodes through the electrolyte. The smallest current which caused a detectable circular motion of the electrolyte (at 30-fold magnification) was 10 microamperes. This supplementary experiment, of course, suggests a means of making the method quantitative, or at least semiquantitative. That is, a calibration curve could be derived relating the current to the angular velocity of the major portion of the electrolyte.

These techniques offer a method of detecting and estimating corrosion currents. It is especially applicable to the radial flow currents associated with pitting corrosion and with corrosion at pores or pits in plated coatings. Such currents are not readily detected by other means, except indirectly. Measuring effects such as weight changes over a relatively long period of time gives average currents only.

*F = force, e = electric charge, E = electric intensity, V = velocity of charge, H = magnetic intensity, c = velocity of light.
Principles of Electricity by L. Page and N. I. Adams Jr. 2nd Edition, p. 269.

Fielding Ogburn received a BS degree in 1941 from the University of Chicago, and is the assistant chief, Electrodeposition Section of the National Bureau of Standards. Mr. Ogburn is a member of the ACS; ASTM, serving as chairman, Subcommittee 1, Committee B-8; past chairman, Washington-Baltimore Section, Electrochemical Society. He is a Delegate and has served as Alternate Delegate, Secretary, Librarian and President of the Baltimore-Washington Branch, AES. Mr. Ogburn is Project Director of AES Project 13.

William H. Roberts received a BS degree in 1958 from the American University, Washington, D. C. He was a student trainee for a year before becoming a chemist for the Electrodeposition Section of the National Bureau of Standards.

MEASUREMENT OF THE THICKNESS OF ELECTROPLATES BY ELECTROLYTIC STRIPPING METHOD:

Stripping Solutions for Silver Over Copper, Brass, Mild Steel and Nickel

by P. B. MATHUR and N. KARUPPANAN*

FRANCIS[1] HAS SUGGESTED the use of 10 per cent NaOH as anodic stripping solution for testing the thickness of alkali soluble metal electroplates such as tin, lead, zinc and chromium and a 10 per cent potassium cyanide solution for cadmium, copper, silver, gold and brass. Although these solutions are good chemical solvents for various metals, they do not show 100 per cent anodic current efficiency in electrolytic stripping at high current densities and fail to give properly stripped spots, besides showing inconsistency in observed potential. In earlier communications a stainless steel stripping cell,[2] a testing instrument[3] and stripping solutions[4] for a few combinations of plated and basis metals have been reported. In the present paper thickness tests for silver plated over copper, brass, mild steel and nickel bases are described and the stripping solutions for these combinations reported.

Low anodic current efficiency of metal dissolution reaction is usually associated either with the evolution of oxygen or the oxidation of certain substances at the anode. A highly corrosive solution, on the other hand, increases the resultant current efficiency beyond 100 per cent. A proper stripping solution, therefore, should not show any gassing at the anode and should be free from oxidizable ions; it itself should not readily react with the plated metal. A good solution should also give a sharp change in voltage at the end point of stripping and a sharply defined stripped spot with an unetched surface.[5] The following stripping solutions have been worked out for testing silver electroplates over copper, brass, mild steel and nickel, in the light of the above mentioned requirements.

Combinations	Stripping Solutions
Silver plated over Copper	10% KF
Silver plated over Brass	10% KF
Silver plated over Mild Steel	10% $NaNO_3$ + 0.5% HNO_3
Silver plated over Nickel	10% $NaNO_3$ + 0.5% HNO_3

These solutions can be used for testing silver coatings up to 1.8 mils thick.

EXPERIMENTAL

Experimental arrangements are made as described in earlier communications. Current within a range of 10 to 25 milliamps has given satisfactory results over a stripping area of 0.74 cm^2. The instrument and the stainless steel stripping cell described in earlier papers have been used here. The initial voltage and the change in end point voltage are the functions of current values. The voltages values in respect to the stripping solutions reported here are given in Table I.

When coatings thicker than one mil were tested, a large quantity of anodically dissolved silver accumulated at the bottom part (which is narrow) of the stainless steel cell. Due to a high cathodic current density in this region of the cell, the reduction of silver ions commenced at the cathode and proceeded towards the rubber washer and the anode, and short circuited the anode and cathode. This gave rise to some trouble. The voltage of the system gradually decreased and the stripping reaction was slowed down. This difficulty, which arose due to the closeness of anodic and cathodic surfaces, has been avoided by pasting the bottom part of the cell, where the cathodic current density was maximum, by an insulating material like quickfix. Reduction of silver in close vicinity of the anode was thus completely checked and the undesirable changes in voltage readings were also stopped.

The studies on chemical action of the solution on electroplate and on the current efficiency have been made. Finally, the results of anodic stripping tests were compared with those of the microscopic tests.[6]

For the chemical action test, the stripping solution contained in the stainless steel cell is kept in contact with the electroplate for some time, first without passing the current and later the current is passed and stripping time is noted.

TABLE I

Concentration	Initial voltages corresponding to 10-30 ma current range	End point voltage changes corresponding to 10 to 30 ma current range
1. Silver over Copper	2.2–3v	50 to 360 mv
2. Silver over Brass	2.0–2.5v	100 to 400 mv
3. Silver over Mild Steel	0.8–1.3v	100 to 300 mv
4. Silver over Nickel	0.8–1.2v	100 to 300 mv

*Central Electrochemical Research Institute, Karaikudi, India.

CHEMICAL ACTION STUDY

TABLE II (a)

Silver Over Copper:

Time interval in minutes	Stripping time	Thickness in inches
0	39.4	0.00055_0
5	40.2	0.00056_1
10	41.0	0.00057_2
15	40.4	0.00056_4
20	40.0	0.00055_8
25	40.2	0.00056_1

TABLE II (b)

Silver Over Mild Steel:

Time interval in minutes	Stripping time	Thickness in inches
0	61.0	0.0010_4
5	61.5	0.0010_5
10	61.0	0.0010_4
15	60.0	0.0010_3
15	63.0	0.0010_8
20	62.5	0.0010_7
25	63.5	0.0010_9
30	63.5	0.0010_9

The time for keeping the solution in contact with the plate when current is not passed, the time of electrochemical stripping and the calculated values of thicknesses for various experiments are tabulated in Table II. The results show that the chemical action of the stripping solution on the electroplate is negligible.

CURRENT EFFICIENCY STUDY

TABLE III (a)

Silver Over Copper:

Current in milliamperes	Stripping time in seconds	Thickness in inches
12	81	0.00044_0
15	65	0.00044_1
20	46.8	0.00042_4
25	37.4	0.00042_5
30	32.0	0.00043_1
		0.000432 ± 0.000016*

TABLE III (b)

Silver Over Mild Steel:

Current in milliamperes	Stripping time in seconds	Thickness in inches
12	120	0.00082_0
15	97	0.00082_7
15	95	0.00081_2
20	71.5	0.00081_5
20	71	0.00080_9
25	55.5	0.00079_0
25	55	0.00078_2
30	46	0.00078_6
30	47	0.00080_2
		0.000814 ± 0.000004*

*Quantity suffixed to ± indicates the average deviation of the mean at 99 per cent confidence limit.

The current efficiency tests are made over the same plate using different magnitudes of current. The readings are tabulated in Table III. The results indicate that the current efficiency is nearly independent of current density (within 5 to 30 milliamps current range) and therefore, lie nearly within the one hundred per cent efficiency region.

COMPARISON OF THICKNESS VALUES (IN INCHES) OBTAINED BY ANODIC STRIPPING AND MICROSCOPIC METHODS

TABLE IV (a)

Silver Over Copper:

Plate 1		Plate 2	
Anodic Stripping	Microscopic	Anodic Stripping	Microscopic
0.00072_6	0.00066_4	0.0018_0	0.0016_8
0.00070_2	0.00069_1	0.0017_4	0.0017_1
0.00071_5	0.00070_7	0.0017_2	0.0016_7
0.00072_9	0.00071_0	0.0017_9	0.0016_7
0.00071_5	0.00072_2	0.0018_1	0.0017_2
0.00072_3	0.00074_1	0.0018_4	0.0018_0
0.00072_6	0.00074_9	0.0018_1	0.0018_3
0.00071_7			0.0018_6
0.00071_2			0.0018_1
			0.0018_4
			0.0018_9
$0.000718 \pm$	$0.000710 \pm$	$0.00179 \pm$	$0.00177 \pm$
0.0000088*	0.000032*	0.000052*	0.000078*

TABLE IV (b)

Silver Over Brass:

Plate 1		Plate 2	
Anodic Stripping	Microscopic	Anodic Stripping	Microscopic
0.00083_8	0.00086_5	0.0014_3	0.0014_1
0.00081_9	0.00086_1	0.0014_7	0.0014_3
0.00079_9	0.00085_5	0.0015_0	0.0014_4
0.00085_2	0.00084_9	0.0015_0	0.0014_4
0.00080_7	0.00085_3	0.0015_2	0.0014_4
0.00082_5	0.00086_5	0.0015_1	0.0014_1
0.00084_0	0.00088_2	0.0015_1	0.0014_5
0.00085_4	0.00084_9	0.0015_3	0.0014_7
	0.00086_1		0.0014_5
	0.00086_9		0.0014_4
	0.00084_5		0.0014_2
	0.00084_9		0.0014_3
	0.00084_9		0.0014_4
	0.00084_5		
	0.00085_3		
$0.000829 \pm$	$0.000857 \pm$	$0.00150 \pm$	$0.00144 \pm$
0.000024*	0.0000086*	0.00003*	0.000015*

*Quantity suffixed to ± indicates the average deviation of the mean at 99 per cent confidence limit.

The comparison of the anodic stripping values with those obtained by microscopic method for a few electroplates of different order of thicknesses is shown in Table IV. The two values are in good agreement. It may be mentioned that the microscopic values are often lower than the actual values.

The accuracy of the thickness tests for silver electroplates with the stripping solutions reported here is within ±5 per cent.

COMPARISON ON THICKNESS VALUES OBTAINED BY ANODIC STRIPPING AND MICROSCOPIC METHODS

TABLE IV (c)

Silver Over Mild Steel:

Plate 1		Plate 2	
Anodic Stripping	Microscopic	Anodic Stripping	Microscopic
0.00078_3	0.00081_9	0.0012_8	0.0013_0
0.00078_6	0.00081_1	0.0013_1	0.0012_7
0.00080_3	0.00077_2	0.0012_5	0.0012_7
0.00079_0	0.00080_3	0.0013_3	0.0012_6
0.00081_5	0.00079_3	0.0013_3	0.0012_9
0.00080_9	0.00082_2	0.0013_1	0.0012_9
0.00081_9	0.00079_4	0.0013_2	0.0012_8
0.00082_1	0.00080_5		0.0012_4
0.00081_5	0.00081_9		0.0012_5
0.00082_0	0.00075_1		0.0013_1
0.000805 ±	0.000799 ±	0.00131 ±	0.00128 ±
0.000014*	0.000022*	0.000044*	0.000022*

TABLE IV (d)

Silver Over Nickel:

Plate 1		Plate 2	
Anodic Stripping	Microscopic	Anodic Stripping	Microscopic
0.0013_5	0.0013_2	0.0017_0	0.0016_6
0.0013_4	0.0013_9	0.0017_5	0.0016_5
0.0013_5	0.0012_9	0.0017_2	0.0016_3
0.0013_4	0.0012_7	0.0017_2	0.0016_2
0.0013_4	0.0013_2	0.0016_8	0.0016_1
0.0013_7	0.0012_5	0.0017_0	0.0016_3
0.0013_4	0.0013_0	0.0017_1	0.0016_5
0.0013_4	0.0013_3	0.0016_7	0.0016_6
0.0013_5	0.0013_2	0.0017_0	0.0016_4
0.0013_5	0.0013_3		0.0016_7
0.0013_5	0.0012_8		0.0016_8
	0.0013_7		
	0.0013_1		
	0.0013_4		
	0.0012_8		
	0.0013_2		
	0.0013_6		
	0.0013_7		
0.00135 ±	0.00132 ±	0.00171 ±	0.00165 ±
0.0000084*	0.000025*	0.0000022*	0.000019*

*Quantity suffixed to ± indicates the average deviation of the mean at 99 per cent confidence limit.

ACKNOWLEDGMENT

Authors' thanks are due to Professor K. S. G. Doss, director, Central Electrochemical Research Institute, for his interest and helpful suggestions in this work.

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Dr. P. B. Mathur was born at Allahabad, India, in 1928. He received his post-graduate degrees of MSc and PhD in physical chemistry from the University of Allahabad in 1953 and 1956 respectively. In 1957, he joined Birla College, Pilani as an assistant professor, and later in 1958, the Central Electrochemical Research Institute, Karaikudi, as senior scientific officer, where he is associated with a number of research projects pertaining to electrochemistry.

He has advanced and published mathematical theories in various fields of physical chemistry e. g., theories for the Phenomena of Chromotography, Diffusion, Kinetics of Thermal and Photochemical Reactions. He has designed a Bi-Planer Arrangement of Elements which is particularly useful in understanding the corrosion behavior of metals.

In the field of electrochemistry, he has discovered a process of solid phase reduction by which highly pure metals are obtained by the direct reduction of the crystals of metal salts, has developed a semi-flowing junction Method for the Measurement of the Liquid-Junction Potentials, has advanced a Thermodynamic Theory for the Specific Role of Electrolytes in Electrode Processes, obtained a Correlation Between the Standard Metal Potentials and their Atomic and Ionic Radii. At present he is working on the project of the Measurement of the Thickness of Electroplates by Electrolytic Stripping Method where stripping solutions for various industrial combinations of plated and basis metals have been worked out.

He is Life-Fellow of the Indian Chemical Society and Life-Member of the National Academy of Sciences, India. He has won several prizes in scientific essay competitions at the University of Allahabad.

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THE OXIDATION OF CYANIDE-BEARING PLATING WASTES BY OZONE

PART I

by N. E. SONDAK* and B. F. DODGE**

ABSTRACT

An experimental investigation was conducted to establish the stoichiometry of the ozone-cyanide reaction in aqueous solution, to determine the kinetics of this reaction and to study the kinetics of the ozone-cyanate reaction in aqueous solution.

Experiments were performed in a semi-batch system where ozonized-air was passed through a cyanide solution. The variables studied were flow rate of ozonized air, inlet ozone concentration, solution temperature, solution pH, effect of possible catalysts, effect of reactor geometry and the effect of actual plating solution constituents. Experimental runs were also made with pure aqueous cyanate solutions to examine the effect of temperature and solution pH.

Results of these experiments are presented as a series of graphs and tables. These results indicate that the reaction between ozone and cyanide follows the equation:

$$CN^- + O_3 \longrightarrow CNO^- + O_2$$

and that the rate controlling step for the reaction is the mass transfer of ozone.

The data of this investigation were used to design a typical waste plating solution disposal plant with ozone as the oxidizing agent. A similar plant using chlorine was designed. A cost comparison was made for both treatment methods. This showed that, at present, it is less expensive to treat cyanide wastes with chlorine, but, as the cost of ozone generating equipment drops, ozone will become more attractive as a treatment agent.

INTRODUCTION

DISPOSAL OF CYANIDE WASTE solutions has become increasingly important because the sewage disposal regulations in many areas insist upon removal of wastes which can be toxic to plant and animal life.

Numerous methods for cyanide-wastes treatment have been used. At present, the most popular treatment is chemical oxidation of the cyanide with chlorine. Ozone is a strong oxidizing agent, second in oxidation potential only to fluorine.[1] Its use as an oxidant for cyanide wastes was recommended as far back as 1933.[2] In recent years, ozone has become available in tonnage quantities at a competitive cost. This fact and the fact that the decomposition product of ozone is a harmless product—namely oxygen—has caused renewed interest in the use of ozone as a possible oxidant for cyanide wastes.

A study of the oxidation of both cyanide and cyanate ions by ozone, and even molecular oxygen, shows the reaction to be extremely favorable thermodynamically so that the extent of the oxidation is in all cases limited by the rate of reaction and not by equilibrium.

The investigation discussed in this paper was undertaken to study the kinetics, mechanism and economics of the disposal of cyanide waste solutions with ozone, as well as, possible cyanate removal by ozonation.

AIM AND SCOPE OF PRESENT STUDY

The foregoing discussion indicates that ozone is, at present, the most attractive alternative to the use of chlorine for the oxidation of cyanide wastes. The published literature on the subject is conflicting and incomplete, and one aim of this investigation was to remedy this situation as far as the stoichiometry and the kinetics of the ozone-cyanide reaction was concerned, and also to examine the kinetics of the ozone-cyanate reaction. In addition, the experimental data obtained were used to examine the comparative costs of cyanide disposal with ozone and chlorine.

The scope of this study was limited to a study of the system variables required to design an adequate ozone-cyanide waste disposal unit. These variables and their limiting values were:

1. Flow rate of ozonized-air through the cyanide solution: 0.02 to 0.09 ft³/min.
2. Inlet ozone concentration: 5 to 40 mg/l.
3. Operating temperature: room to 80C.
4. Solution constituents: pure aqueous cyanide and actual plating solutions.
5. Solution *p*H: 10 to 12.4.
6. Possible catalysts: copper, manganese, vanadium and iron salts.

LITERATURE SURVEY

The first published account of ozone-oxidation of cyanides was by Neuwirth.[2] He treated KCN solution batchwise with ozonized-air and obtained a substantial reduction in cyanide concentration when iron and manganese catalysts were used. However, the quantitative data given are few and incomplete. What is more, it is not certain but that the cyanide reported as lost might merely have formed metallo-complexes with the catalysts used.

Tyler et al[3] published in 1951 a progress report on the

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ozonation of cyanide wastes, using an actual cadmium plating solution. The following equations were postulated to represent the reactions occurring:

$$2KCN + 2O_3 \rightarrow 2KCNO + 2O_2 \quad (1)$$
$$2KCNO + H_2O + 3O_3 \rightarrow 2KHCO_3 + N_2 + 3O_2 \quad (2)$$
$$2KCN + H_2O + 5O_3 \rightarrow 2KHCO_3 + N_2 + 5O_2 \quad (3)$$

The paper also states that the ozone was completely absorbed by the solution until only a trace of cyanide remained.

Walker and Zabban[4] studied the disposal of cyanide wastes with ozone and found that the cyanides could be rapidly oxidized with ozone but that the oxidation did not proceed beyond the cyanate stage within the available contact time of the ozone with the solution, copper and manganese catalyzed the reaction while the *p*H of the solution in the range of 7 to 12.5 had no effect on the oxidation. The ozone requirements were 1.1 to 1.6 lb O_3/lb CN^- which indicates that the stoichiometry of the reaction fell between that called for by the following two reactions:

$$CN^- + O_3 \rightarrow CNO^- + O_2 \text{ (1.84 lb } O_3 \text{ per lb } CN^-) \quad (4)$$
$$3CN^- + O_3 \rightarrow 3CNO^- \text{ (0.615 lb } O_3 \text{ per lb } CN^-) \quad (5)$$

Two papers on the ozonation of cyanide wastes were given at the international Ozone Conference at Chicago in 1956 while the present work was in progress. R. P. Selm* discussed the ozone oxidation of dilute aqueous cyanide solutions in stirred batch reactors and packed towers while K. K. Khandelwal, A. J. Barduhn and C. S. Grove[16] studied the kinetics of ozonation of cyanides. R. P. Selm used the interesting tool of ORP (Oxidation-reduction potential) to measure the ozone concentration in his solutions. However, insufficient data were in the paper to draw any reliable conclusions. K. K. Khandelwal et al. found their results on kinetics to fit the equation:

$$-\frac{d(CN^-)}{dt} = K(CN^-)^{1/3} \quad (6)$$

They also found that copper ions acted as a catalyst while the anions of copper salts had no effect. In addition, the rate of cyanide-ion disappearance was independent of temperature over a range of 13 to 30C.

However, the analysis of the data by Khandelwal et al. was on the basis of chemical-reaction rate controlling. The 1/3 order dependence and lack of temperature effect obtained indicate that mass transfer, as well as chemical reaction rate, might be important in their work.

EXPERIMENTAL EQUIPMENT AND PROCEDURES

These studies were conducted in the semi-continuous system shown in Fig. 1. Air was used as the oxygen source for the production of ozone. The air, supplied from the atmosphere by means of an air compressor (1), was passed through a pressure regulator (2) and dried by passage through silica gel columns (3) and a dry-ice acetone trap. The dry air was then passed through a Welsbach T-23 laboratory ozonator (4) where some of the oxygen was converted to ozone. The ozonized-air mixture was then passed through a dilute NaOH solution (5) to remove any oxides of nitrogen from the ozonized-air. After this point, a small quantity of the ozonized-air was tapped off through a bleed-off system (6) so that the inlet ozone concentration could be measured. The remainder of the ozonized-air went into the reactor (7). The

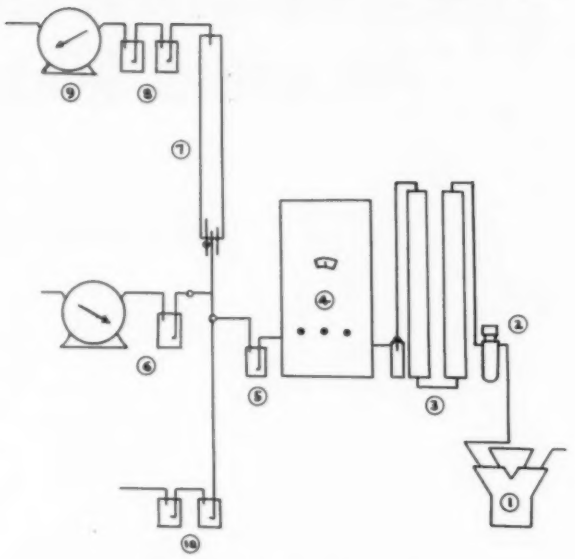

Fig. 1. Experimental equipment.

reactor was a Pyrex glass column, 4 ft by 2⅜ in. I.D. usually operated two-thirds full. The exiting gases from the reactor were passed through an ozone absorption system (8) and then metered by a wet test meter (9) and vented to the atmosphere. The apparatus was provided with a by-pass system (10) for use during start-up periods. Good practices of analytical chemistry were followed during this investigation. All chemicals used were c.p. grade or better. The modified Liebig titration, as described by Dodge et al,[5] was used for the analysis of cyanide and cyanide-plating solutions (other than copper). Copper plating solutions were analyzed by the method given in "Analytical Determination of Trace Constituents in Metal Finishing Effluents," E. J. Serfass and R. F. Murraca.[6]

Cyanate analyses were conducted by the method given by Dodge et al.[5]

The standard method of ozone analysis was used in this investigation.[1]

A typical run procedure was as follows:

1. The ozonator was started and allowed to warm-up at least an hour with the absorption tower by-passed.
2. The solution to be studied was prepared, sampled and the *p*H measured.
3. The clean reactor was rinsed with solution and then filled.
4. Ozonized-air was passed through solution.
5. Samples of solution were taken at regular intervals.
6. The inlet ozone mixture to the reactor was sampled during the run to establish the inlet ozone concentration.
7. The excess ozone leaving the reactor was absorbed so that material balances could be made.
8. The gas volumes fed to the reactor were metered.

The experimental investigation was conducted in three phases. These were (1) the study of pure aqueous cyanide solutions (2) the study of synthetic and actual plating solutions and (3) the study of pure aqueous cyanate solutions.

For the study of pure aqueous cyanide solutions, the variables under experimental investigation were:

*Unpublished.

TABLE I

EFFECT OF INLET OZONE CONCENTRATION, FLOW RATE AND SOLUTION TEMPERATURE ON THE REACTION KINETICS OF THE OZONE-CYANIDE REACTION

Experimental Runs at 30° Centigrade

Run No.	Init. CN^- conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate $\times 10^2$ ft^3/min	Aver. Sol. Temp. °C	pH (at sol. temp.) Init.	Final	K_0 ppm CN/min	Ozone Demand g O_3/g CN
1	159	12.7	1.73	26.8	10.3	7.60	2.19	1.29
2	40.7	7.11	2.49	30.0	10.0	8.60	1.82	2.09
3	405	8.94	3.07	30.0	10.6	10.4	2.11	1.84
4	195	32.5	2.18	27.2	10.4	8.49	4.80	3.21
5	85.3	17.0	2.16	30.0	10.3	9.22	4.01	2.14
6	40.5	19.7	2.44	30.0	10.1	8.13	4.34	2.90
7	230	18.4	2.67	30.1	10.8	9.68	3.67	1.57
8	92.8	29.7	2.19	30.0	10.3	6.79	4.85	2.44
9	205	34.1	1.52	26.2	10.8	8.3	6.14	1.25
10	225	45.2	2.33	30.0	10.6	9.43	6.99	2.02
11	121	8.80	4.68	30.0	10.0	7.71	2.27	2.71
12	61.5	8.35	4.19	30.0	10.1	9.00	2.65	2.41
13	282	7.06	4.46	30.0	10.6	10.4	2.50	1.88
14	208	23.9	3.35	25.9	10.4	7.59	6.15	1.90
15	67.1	14.9	4.30	30.0	10.2	8.61	5.17	2.43
16	307	15.2	4.41	30.0	10.6	9.83	3.93	1.94
17	181	31.7	3.16	26.9	10.2	7.70	7.34	1.97
18	71.8	28.8	4.66	30.1	10.1	8.14	8.25	3.41
19	486	27.3	4.53	30.5	10.7	9.65	7.87	1.82
20	192	6.78	5.53	26.0	—	8.12	3.07	2.47
21	231	7.60	5.24	26.5	10.2	—	3.06	1.64
22	56.7	4.87	6.67	30.0	10.2	8.76	3.07	1.62
23	361	5.70	6.45	30.0	10.5	10.0	2.46	1.83
24	196	16.1	6.65	30.6	10.3	7.60	5.54	2.60
25	70.5	13.3	6.14	30.0	10.2	8.75	5.0	2.90
26	415	11.9	6.28	30.0	10.7	10.1	4.74	1.94
27	156	27.6	4.44	25.4	10.3	8.60	8.1	2.79
28	150	24.2	6.15	29.9	10.3	8.60	8.72	4.06
29	99.4	22.9	5.80	30.0	10.3	8.62	9.78	2.91
30	635	24.5	6.46	30.0	10.8	9.21	10.25	1.78
31	220	4.73	8.70	29.1	10.3	9.02	2.53	2.31
32	93.3	5.43	8.77	30.0	10.3	8.80	3.63	2.43
33	453	4.29	8.46	30.0	10.7	10.1	2.78	1.68
34	94.9	12.3	8.49	30.0	10.2	8.82	7.14	2.90
35	475	9.93	8.44	30.0	10.7	9.80	5.32	1.86
36	103	17.8	7.86	30.2	10.4	8.89	11.1	2.36
37	814	20.5	8.33	30.3	11.0	9.90	11.8	1.80

(*Continued on the following page*)

1. Flow rate of ozonized-air. This flow rate through the reactor was varied in four even increments from 0.024 to 0.084 ft^3 saturated ozonized air at 75F and 1 atmosphere, per minute.
2. Inlet ozone concentration. Three inlet ozone concentrations were used at each flow rate.
3. Solution temperature. A complete set of runs at the four flow rates and three inlet ozone concentrations per flow rate was conducted at room temperature, 30, 50 and 80C.
4. Solution *p*H. The effect of solution *p*H was examined by adding NaOH to the aqueous cyanide solution. The *p*H values used were the natural aqueous cyanide solution *p*H (about 10.3), a *p*H of about 11.2 and a *p*H value of 12.4. These runs were conducted at a single flow rate and two inlet ozone concentrations at 30C.
5. Effect of possible catalysts. Salts of copper, manganese, vanadium and iron were added as possible catalysts. Concentrations of from 1 to 10 ppm of metal were used.
6. Effect of reactor geometry. To ascertain the effect of reactor geometry, that is the ratio of liquid depth in the reactor to reactor diameter, four experimental runs were performed, with levels varying from full to one-third full.

Experiments were also performed with synthetic plating solutions made in the laboratory from c.p. grade chemicals

TABLE I (Continued)

EFFECT OF INLET OZONE CONCENTRATION, FLOW RATE AND SOLUTION TEMPERATURE ON THE REACTION KINETICS OF THE OZONE-CYANIDE REACTION

Experimental Runs at 50° Centigrade

Run No.	Init. CN^- conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate $\times 10^2$ ft³/min	Aver. Sol. Temp. °C	pH Init.	pH Final	K_0 ppm CN/min	Ozone Demand g O_3/g CN
38	122	10.8	2.79	50.1	10.1 @ 43.6°	9.05 @ 42.3°	2.14	2.31
39	64	8.45	2.68	50.0	10.1 @ 45.4°	8.92 @ 44.1°	2.15	1.82
40	386	8.96	3.10	51.1	10.6 @ 30.2°	10.2 @ 32.0°	2.11	1.96
41	133	20.7	2.82	50.1	10.1 @ 44.4°	9.1 @ 44.0°	4.51	2.38
42	85.4	17.7	2.76	50.0	10.0 @ 46.4°	8.64 @ 45.4°	3.91	2.11
43	88.2	16.1	2.70	50.1	10.1 @ 46.0°	9.20 @ 46.2°	3.70	1.99
44	126	27.1	2.69	50.1	9.93 @ 49.2°	8.63 @ 38.4°	5.51	3.00
45	98	27.3	2.48	49.9	10.0 @ 45.7°	8.70 @ 45.2°	5.00	2.58
46	212	7.04	4.59	50.0	10.3 @ 46.4°	8.91 @ 40.3°	2.78	2.27
47	68.5	4.80	4.41	50.3	10.0 @ 47.5°	8.95 @ 45.8°	1.96	1.81
48	380	6.66	4.60	53.5	10.6 @ 34.5°	10.1 @ 42.0°	2.59	1.86
49	362	15.2	4.51	50.2	10.5 @ 42.0°	9.96 @ 40.9°	4.70	1.97
50	214	19.8	4.40	50.1	10.2 @ 48.6°	6.07 @ 48.6°	6.07	2.79
51	83	12.3	4.39	50.1	10.0 @ 48.5°	8.80 @ 46.1°	4.64	1.99
52	242	29.5	4.05	50.2	10.4 @ 45.6°	8.87 @ 40.8°	6.96	3.75
53	85	25.1	4.07	49.9	10.1 @ 47.1°	8.70 @ 45.4°	6.78	2.69
54	600	28.6	4.54	52.6	10.6 @ 37.6°	9.59 @ 35.8°	9.25	1.83
55	205	6.36	6.03	50.0	10.2 @ 46.8°	8.95 @ 47.5°	2.48	2.55
56	95	4.24	5.96	50.0	10.0 @ 48.3°	8.72 @ 46.8°	2.23	1.39
57	198	14.1	6.46	50.1	10.2 @ 45.1°	8.78 @ 41.4°	7.05	2.37
58	98	8.23	4.01	50.0	9.91 @ 45.6°	9.65 @ 45.6°	4.77	0.99
59	242	21.5	6.22	50.2	10.3 @ 48.5°	8.70 @ 40.4°	9.82	2.30
60	128	22.5	5.99	50.0	9.91 @ 46.6°	8.65 @ 45.6°	9.30	2.29
61	635	29.3	6.25	50.5	10.7 @ 31.5°	9.27 @ 41.4°	10.45	2.11
62	201	5.24	7.70	50.1	10.2 @ 45.3°	8.99 @ 41.5°	2.86	2.40
63	213	13.8	6.53	50.1	10.3 @ 47.6°	8.90 @ 42.2°	7.51	2.75
64	302	20.1	8.25	50.2	10.3 @ 47.7°	8.61 @ 41.6°	11.3	2.47
65	728	20.5	8.45	50.1	10.9 @ 26°	9.43 @ 41.6°	12.3	1.96

Experimental Runs at 80° Centigrade

66	160	11.5	2.31	80.1	9.83 @ 65.2°	9.15 @ 69.4°	1.68	2.55
67	179	24.6	2.41	80.1	9.83 @ 72.5°	8.85 @ 72.5°	3.75	2.53
68	187	30.7	2.39	80.1	9.82 @ 65.2°	8.88 @ 57.5°	5.36	2.24
69	157	8.20	4.33	80.1	9.76 @ 76.2°	9.25 @ 58.7°	2.41	2.27
70	167	20.3	4.00	80.0	9.73 @ 68.3°	9.16 @ 70.4°	5.38	2.60
71	186	32.5	3.82	80.2	9.73 @ 69.1°	9.20 @ 71.4°	7.67	3.07
72	243	5.66	5.44	80.0	9.87 @ 65.5°	9.83 @ 82.1°	3.00	2.73
73	215	16.2	6.14	80.4	9.78 @ 67.8°	9.52 @ 68.1°	6.54	2.28
74	223	21.7	6.34	80.6	9.73 @ 69.1°	9.20 @ 71.4°	9.46	2.12
75	235	5.11	8.45	80.0	9.83 @ 70.2°	9.80 @ 70.4°	3.04	2.06
76	235	11.16	8.35	79.9	9.85 @ 69.2°	9.68 @ 69.7°	6.46	2.47
77	218	18.15	7.84	80.0	9.62 @ 72.5°	9.38 @ 69.8°	9.01	3.44

and distilled water and with actual plating solutions used in an industrial plating establishment. Conditions for these experiments were the same as used with pure cyanide solutions. Zinc, synthetic and actual; cadmium, synthetic and actual; and copper, synthetic plating solutions were used in this investigation.

Experimental runs were also performed to establish the kinetics of the decomposition of cyanate by ozone.

EXPERIMENTAL RESULTS

Experimental data for selected runs, in the investigation of cyanide ozonation, are presented in Figs. 2, 3, 4 and 5 as

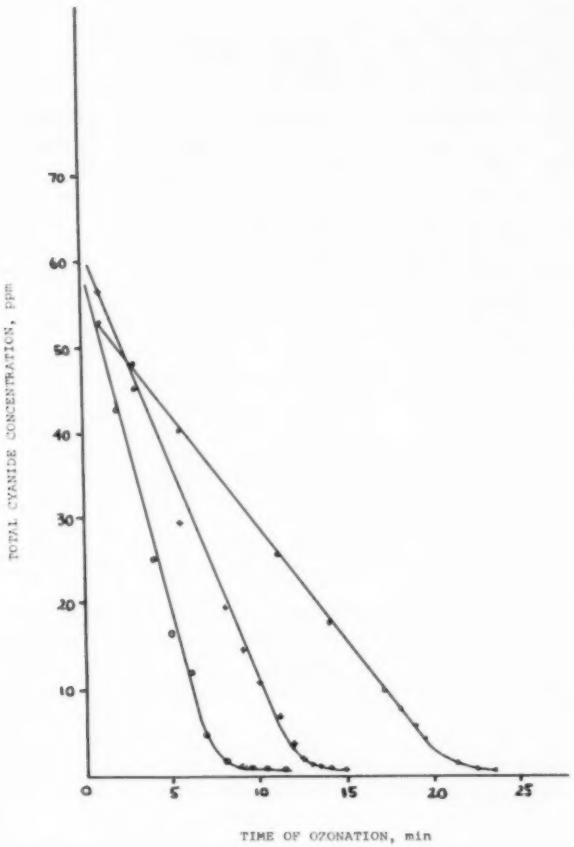

Fig. 2. Pure aqueous cyanide solution, total cyanide concentration versus time of ozonation at constant flow rate of ozonized-air, 30C but different inlet ozone concentrations.

Legend

Symbol	Run Number	Flow Rate ft³/min × 10²	Inlet Ozone Conc. mg/l
•	12	3.19	8.35
×	15	4.30	14.9
○	18	4.66	26.8

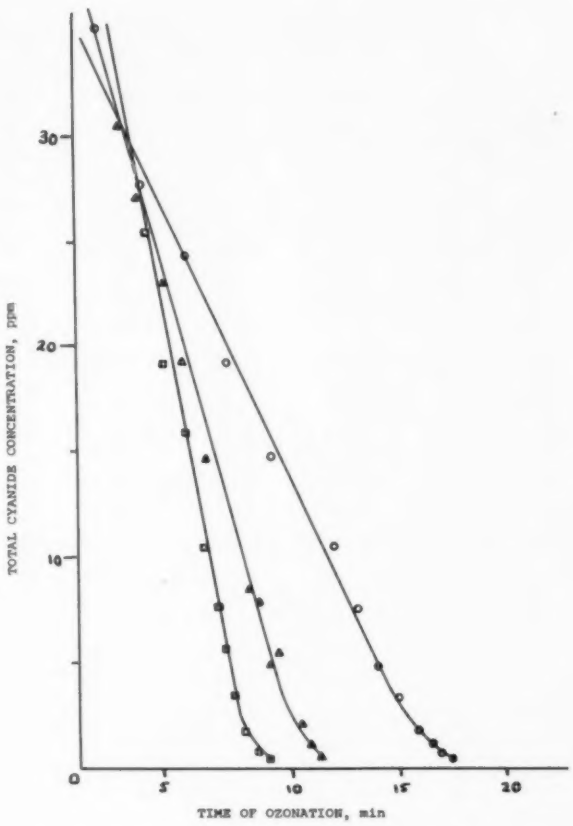

Fig. 3. Total cyanide concentration versus time of ozonation for copper plating solution at constant flow rate of ozonized-air, but different inlet ozone concentrations.

Legend

Symbol	Copper Plating Run Number	Flow Rate ft³/min × 10²	Inlet Ozone Conc. mg/l
○	1	4.53	6.70
△	2	3.22	12.2
■	3	4.21	24.6

TABLE II

EXPERIMENTAL RUNS TO EXAMINE THE EFFECT OF POSSIBLE CATALYSTS ON THE REACTION KINETICS OF THE OZONE-CYANIDE REACTION

Run No.	Init. CN conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate × 10² ft³/min	Aver. Soln. Temp. °C	Catalyst	Amount of Catalyst ppm Metal	Initial pH		Final pH		K_0 ppm CN min	Ozone Demand g O_3/g CN
							pH	t. °C	pH	t. °C		
1	219	18.6	3.98	50.0	Mn	1	10.15	49	8.53	44	4.98	2.25
2	203	18.6	3.59	50.0	Mn	10	9.87	42	8.65	44	4.70	2.22
3	203	19.4	3.90	30.0	Mn	1	10.41	29	8.64	26	5.15	2.38
4	211	18.0	3.90	30.2	Mn	4	10.38	30	8.20	25	5.05	2.14
5	207	20.0	3.52	30.0	Mn	10	10.25	27	8.35	28	4.40	1.95
6	182	16.3	4.35	30.3	—	0	10.40	31	8.89	29	5.50	1.89
7	181	19.8	4.26	30.0	Cu	1	10.30	29	9.05	29	5.50	2.47
8	195	16.2	4.19	30.1	Cu	4	10.32	30	9.05	29	5.15	1.90
9	165	16.6	4.31	30.0	Cu	10	10.32	29	9.13	29	5.45	2.46
10	198	17.8	4.26	30.0	$(NH_4)VO_3$	10V	10.18	29	8.75	28	5.60	2.36
11	208	17.0	4.25	30.0	Fe	10	10.20	29	7.92	29	5.75	2.25

TABLE III

EXPERIMENTAL RUNS TO EXAMINE THE EFFECT OF SOLUTION pH ON THE REACTION KINETICS OF THE OZONE-CYANIDE REACTION

Run No.	Init. CN conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate $\times 10^2$ ft³/min	Aver. Soln. Temp. °C	NaOH Added moles/l	Initial pH		Final pH		K_0 ppm CN min	Ozone Demand g O_3/g CN
						pH	t. °C	pH	t. °C		
1	95	12.2	4.28	30.0	0	10.38	28	9.23	29	4.96	2.22
2	93	13.9	4.10	30.0	0.001	11.61	29	11.60	29	5.31	2.83
3	88	12.5	4.36	30.0	0.01	12.40	29	12.30	29	5.71	2.96
4	361	14.6	4.65	30.0	0.002	11.34	26	11.16	27	4.35	1.82
5	301	13.2	4.83	29.9	0.08	12.59	26	12.43	27	5.22	1.58
6	361	6.76	4.78	30.0	0.002	11.30	27	11.08	27	2.66	1.66
7	354	6.18	4.75	30.0	0.08	12.37	26	12.37	27	3.11	1.61
8	540	31.1	4.10	30.0	0.002	11.45	26	10.94	29	8.1	2.10
9	546	31.9	4.20	30.0	0.08	12.41	26	12.45	24	10.1	2.19
10	211	19.4	3.54	80.4	0.01	11.1	—	—	—	4.43	2.55
11	197	20.9	4.22	80.0	0.1	11.50	69	11.48	66	4.67	3.17
12	179	19.4	4.49	80.0	1.0	11.8	69	11.8	66	4.27	4.06
13	213	18.4	4.20	50.2	0.01	11.3	46	11.3	47	5.12	—
14	219	18.3	4.21	49.9	0.10	11.87	46	11.83	44	4.40	2.53

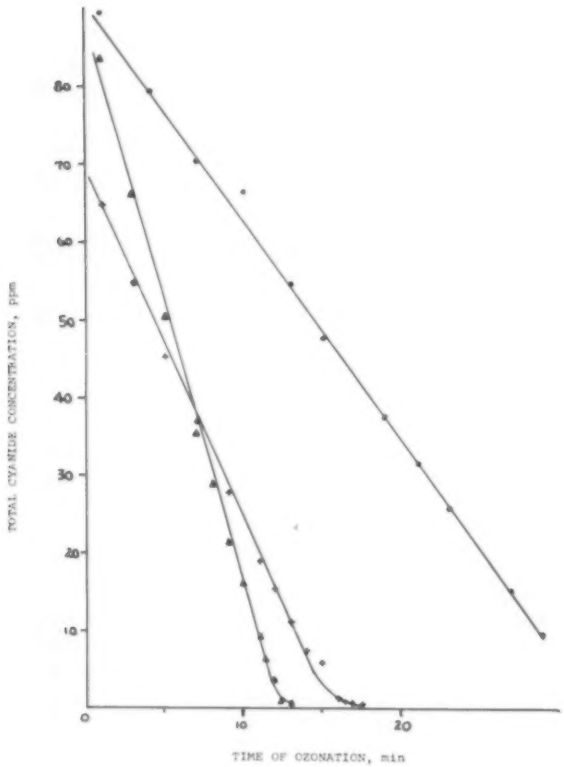

Fig. 4. Total cyanide concentration versus time of ozonation for zinc plating solutions at constant flow rate of ozonized-air but different inlet ozone concentrations.

Legend

Symbol	Zinc Plating Run Number	Flow Rate ft³/min × 10²	Inlet Ozone Conc. mg/l
•	1	4.68	6.59
+	3	4.42	14.8
△	4	4.20	28.6

graphs of total cyanide concentrations versus time of ozonation. Similar graphs were made for each run of the study, and those reported are representative. Presenting these graphs for the numerous runs made in this investigation would be

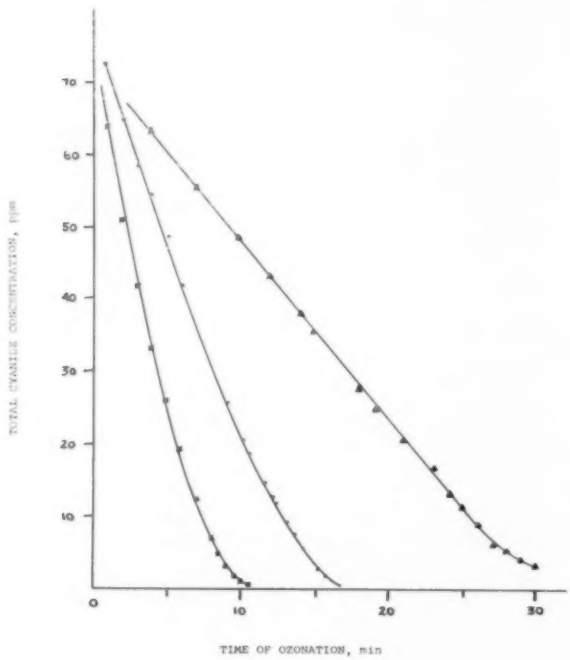

Fig. 5. Total cyanide concentration versus time of ozonation for cadmium plating solutions.

Legend

Symbol	Cadmium Plating Run Number	Flow Rate ft³/min × 10²	Inlet Ozone Conc. mg/l
•	2	8.50	7.81
△	3	2.90	11.3
×	4	4.36	24.9

TABLE IV

EXPERIMENTAL RUNS TO EXAMINE THE EFFECT OF COLUMN GEOMETRY ON THE REACTION KINETICS OF THE OZONE-CYANIDE REACTION

Run No.	Still Liquid Height (ft)	Inlet O_3 conc. mg O_3/l	Exit O_3 conc. mg O_3/l	Flow Rate $\times 10^2$ ft³/min	Average Solution Temp. °C	K_0 ppm CN/min	Ozone Demand g O_3/g CN
1. A	2.66*	20.7	0.35	7.28	31.0	10.92	1.89
B	2.03	20.7	1.0	7.20	31.0	13.2	2.16
C	1.37	20.7	2.6	7.39	31.0	19.6	1.95
D	0.71	20.7	15.3	8.39	31.0	24.6	0.98
2. A	2.66	33.2	0.96	2.46	30.6	5.16	2.17
B	2.10	33.2	3.87	2.42	30.1	6.87	1.72
C	1.43	33.2	7.90	2.44	30.1	9.25	1.99
D	0.84	33.2	11.7	2.33	30.1	16.7	1.29
3. A	2.66	30.1	2.0	4.16	30.4	7.75	1.90
B	2.04	30.1	6.1	4.02	30.2	8.55	2.12
C	1.61	30.1	9.1	4.07	30.2	10.5	2.03
D	0.98	30.1	13.1	3.97	30.2	15.7	2.11
4. A	2.66	26.1	1.3	6.09	30.0	10.3	2.08
B	2.00	26.1	4.2	6.54	30.0	11.3	2.33
C	1.42	26.1	9.1	5.10	30.0	13.8	1.80
D	0.84	26.1	14.1	5.91	30.3	17.5	2.08

*Full.

impractical for this publication, so that the results of all the runs are given in tables. These tables give ozonation conditions, ozone demand and the value of the slope of straight line portion of the cyanide concentration versus ozonation time curve.

Table I presents the results obtained to examine the effect of inlet ozone concentration, flow rate and solution temperature on the kinetics of the ozone-cyanide reaction.

Table II gives the results of runs conducted to examine the effect of possible catalysts on the reaction kinetics, while Table III presents the effects of varying *p*H of the solution.

The results of reactor geometry studies, given in Table IV

TABLE V

EXPERIMENTAL RESULTS FOR CADMIUM PLATING SOLUTIONS SHOWING A ZERO ORDER RATE PERIOD

Run No.*	Init. CN conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate $\times 10^2$ ft³/min	Aver. Sol. Temp. °C	pH (at sol. Temp.) Init.	pH (at sol. Temp.) Final	K_0 ppm CN/min	Ozone Demand g O_3/g CN
1	75	8.28	4.65	30.0	10.6	8.55	2.49	2.54
3	79	11.3	2.90	30.2	10.7	8.51	2.53	2.16
7	454	17.6	4.16	29.7	11.4	11.0	4.44	2.06
8	536	17.9	4.41	30.2	11.3	10.9	5.41	2.07
9	450	17.2	4.28	29.9	11.0	10.7	5.64	1.89

*All runs except No. 9 were with synthetic plating solution. For Run No. 9, an actual cadmium plating solution was used.

TABLE VI

EXPERIMENTAL RESULTS FOR COPPER PLATING SOLUTIONS

Run No.	Soln. Type*	Init. CN conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate $\times 10^2$ ft³/min	Aver. Soln. Temp. °C	Initial pH pH	Initial pH t. °C	Final pH pH	Final pH t. °C	K_0 ppm CN/min	Ozone Demand g O_3/g CN
1	S	34	6.70	4.53	32.2	10.21	30	8.98	31	1.93	2.84
2	S	36	12.17	4.33	32.2	10.28	30	9.01	30	3.32	3.35
3	S	44	24.6	4.21	33.1	10.38	32	9.12	31	5.13	4.41
4	S	36	5.85	2.77	32.5	10.22	32	9.11	31	1.86	2.19
5	S	44	7.44	8.26	32.2	10.30	31	9.07	31	4.26	2.86
6	S	44	12.9	4.25	51.0	10.24	47	8.64	45	3.52	3.07

*S = Synthetic.

TABLE VII

EXPERIMENTAL RESULTS FOR ZINC PLATING SOLUTIONS

Run No.	Soln. Type*	Init. CN conc. ppm CN	Inlet O_3 conc. mg O_3/l	Flow Rate × 10^2 ft^3/min	Aver. Soln. Temp. °C	Initial pH		Final pH		K_0 ppm CN/min	Ozone Demand g O_3/g CN
						pH	t. °C	pH	t. °C		
1	S	90.5	6.59	4.68	30.3	11.2	28	11.0	28	2.89	2.21
2	S	94	16.1	4.07	30.1	11.27	29	11.02	29	4.09	2.05
3	S	71	14.8	4.42	30.0	11.12	30	10.8	29	4.61	2.60
4	S	94	28.6	4.20	30.0	11.18	29	10.6	29	7.57	2.67
5	S	75	11.6	2.68	30.0	11.21	27	10.86	28	2.26	2.47
6	S	73	10.2	8.44	30.0	11.22	30	10.77	29	5.83	2.48
7	S	74	16.7	4.70	50.0	11.10	45	10.9	39	5.54	2.51
8	A	75	12.51	4.28	30.1	10.74	28	9.89	30	4.21	2.09
9	C-Cu	66	15.4	4.01	32.0	11.28	29	10.69	30	4.58	2.81
10	C-Mn	70	12.7	4.16	30.0	11.22	28	10.71	29	4.37	2.17
11	S	376	15.6	4.68	30.0	11.84	26.0	11.66	27.1	5.20	1.73
12	S	453	17.62	4.54	50.2	11.71	37	11.51	37	5.81	1.86
13	A	555	14.3	4.49	30	11.74	25	11.5	27	4.57	2.21

*S = Synthetic.
A = Actual.
C = Possible Catalyst.

and Tables V, VI and VII summarizes the reaction-rate data for both synthetic and actual plating solutions.

Results of the entire cyanate study are shown as a plot of cyanate concentration versus time of ozonation in Fig. 6.

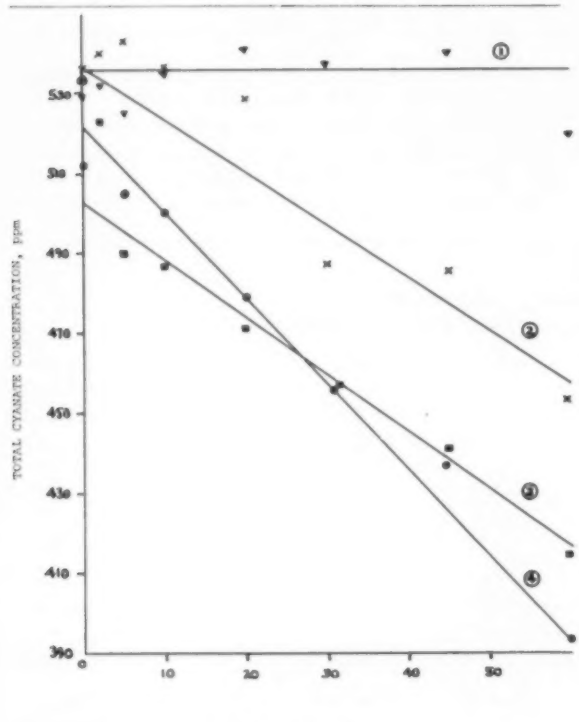

Fig. 6. Total cyanate concentration versus time of ozonation for aqueous cyanate solutions.

Legend

Symbol	Run Number	Solution Temp °C	Initial Solution pH	Flow Rate ft^3/min × 10^2	Inlet Ozone Conc. mg/l
▽	1	50	8.9 at 36C	4.47	0.0
■	2	30	9.1 at 27C	4.62	27.2
×	3	50	8.9 at 42C	4.56	27.5
⊙	4	30	11.2 at 27C	4.63	29.4

A = Mass transfer area, square feet.

C_B = Concentration of component B in the liquid phase, pound-moles per cubic foot.

C_{LM} = log mean ozone concentration, milligrams per liter.

(CN^-) = Cyanide ion concentration in the liquid phase, ppm.

D_A = Diffusivity of component A in the liquid, square feet per hour.

D_B = Diffusivity of component B in the liquid, square feet per hour.

H = Henry's Law constant, atmospheres—pound moles per cubic foot.

h = liquid height, feet.

K_0 = Zero order reaction rate constant, ppm CN^-/min.

K_1 = First order reaction rate constant, min^{-1}.

k_g = Gas-film coefficient of mass-transfer, pound moles per hour per square foot.

$k_g'A$ = Gas-film coefficient of ozone in bubble column, liters ozone per min per square foot cross sectional area of column.

N = Pound moles transferred per hour per square foot.

M = Milligrams of ozone transferred per min.

O_3 = Inlet ozone concentration, milligrams per liter.

p = Solute gas partial pressure, atmospheres.

t = Time, minutes.

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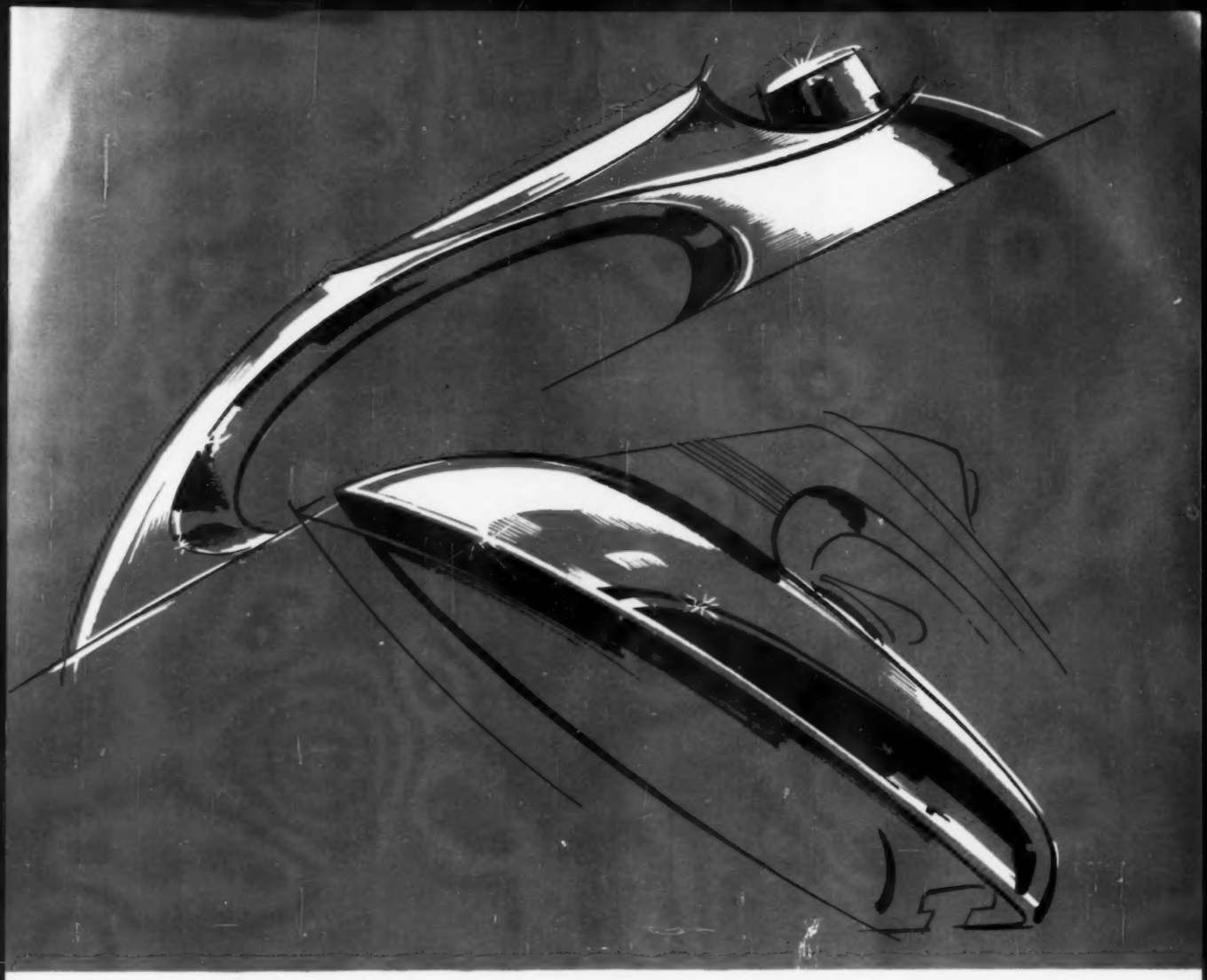
(*To be Continued*)



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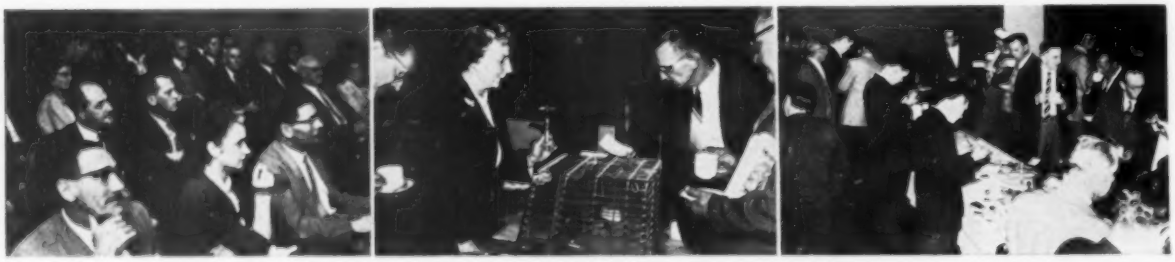
The Charles Henry Proctor Memorial Leadership Award Selection Committee for 1960–1961 is headed by National President W. Andrew Wesley and, besides Mr. and Mrs. William O. Preston (the donors), is composed of National Executive Secretary John P. Nichols, Research Committee Chairman D. Gardner Foulke, Order of Past Presidents Chairman Samuel S. Johnston, Kansas City Branch President Warren B. Eliot and Syracuse Branch President William M. Robinson.

Each of these is ineligible, of course, to participate in any way in the discussion or action of any AES Board, Branch, Committee or Order of which he may be head or member, nominating any AES member in good standing for the Proctor Award. Branch and Committee nominees will be judged competitively entirely upon the merit and significance to AES, of the 1959-1960 deed or deeds upon which their respective AES Board and/or Committee nominations are predicated.



(Left) Technical Session at Sydney Technical College. (Center) Mrs. Innis Coulson, speaker, chats about exhibits with F. A. Coker, Mr. Godfrey and R. Facer. (Right) Buffet offers opportunity for discussion.

SYDNEY BRANCH'S NOVEMBER MEETING: ONE OF ITS SERIES OF SPECIAL RESEARCH LECTURES

"Since you have specifically requested news of our Australian Branches," W. H. Coulson, current President of AES's Sydney Branch recently wrote National President W. Andrew Wesley, "We have enclosed photographs taken at one recent November (1960) Branch Meeting as an example of the interest taken in a series of lectures over the last five months by speakers nominated from our leading Supply Houses to discuss recent research developments.

"It may be of interest," Coulson continued, "that the technical speaker on this occasion was my wife, who is our Librarian and a very active Branch Member."

With respect to a Branch visit made by A. Korbelak of the Sel-Rex Corporation, he added, ". . . As you can imagine, we kept him busy answering questions, and were disappointed that his stay in Sydney was so brief."

AES NEWS

LIFT! HELP YOUR BRANCH ATTAIN ITS MEMBERSHIP EXPANSION GOAL

CREDENTIALS AND DATA ISSUED TO AES'S 1960-1961 ACCREDITED GOVERNORS

At the Annual Meeting of the Supreme Society held in Detroit, June 18, 1959, that AES governing council ordered, in effect, that the Minutes of its (Supreme Society) meetings thereafter be issued to each accredited Delegate and Alternate Delegate, and to each Branch President and Secretary, in condensed, standard Minute form prepared by the Board from the official proceedings stenotyped by the Official Convention Reporter, instead of in the voluminous verbatim stenotyped transcript form, as "Business Proceedings," heretofore employed. The Minutes of Supreme Society meetings have ever since been issued in that form.

The Executive Board having approved its final draft of the Minutes of the Supreme Society meetings held at Los Angeles, July 25 and July 28, 1960 first drafted by Law Committee Chairman Manson Glover, that mimeographed final draft was consequently issued by the Board to all recently accredited 1960-1961 Delegates and Alternates, and to all current Branch Presidents and Branch Secretaries, on January 2, 1961.

At the same time, each accredited 1960-1961 Delegate and Alternate Delegate not only was sent his credentials card but also a copy of the Notice of Interim Meeting to be held at the Statler Hotel, Hartford, Connecticut, February 11, 1961, accompanied by a final draft of the Agenda of that meeting.

NINE-SESSION, THIRTY-PAPER BOSTON CONVENTION EDUCATIONAL PROGRAM FROZEN BY EDITORIAL BOARD

Heralded as one of the most versatile Educational Sessions Programs, at this stage, developed for an AES Annual Convention for some years, the Editorial Board of the Society, responsible for such Programs, "froze" and preliminarily approved the Tentative Educational Program of the Society's 48th Annual Convention (Boston, June 18–23, 1961) at the Editorial Board's meeting held at National Headquarters, Newark, December 16, 1960, with Board Chairman John P. Nichols presiding.

Subject to Editorial Board review and approval of the final papers themselves, the Boston Convention's Tentative Educational Program features nine Sessions embodying 28 technical papers, aside from the Annual Research Report by the AES Research Committee Chairman and, of course, the "William Blum Lecture," this year to be delivered by Dr. Charles L. Faust, 1959-1960 winner of the AES Scientific Achievement Award.

Among the 28 widely-ranging, preliminarily approved titles, eight will compose the "Finishing of Light Metals" Symposium that will be a high spot of the Boston Convention. Four of the eight symposium papers will cover finishing of Aluminum; two will be pinpointed to Magnesium; two will treat Beryllium. The Symposium will also include a "Forum on the Finishing of Light Metals."

The titles of the Tentative Program as "frozen" and preliminarily approved are woven into the Tentative Convention Program spread on pages 192 and 193 of this issue of PLATING MAGAZINE. The Program will be finalized at the Board's meeting to be held in Detroit, April 6-7, 1961.

With Joseph Andrus, Host Branch Educational Program Chairman of the AES's 49th Annual Convention (Milwaukee, June 1962) present by invitation, the Board also gave large attention to a preliminary discussion of the proposed format and coverage of the Educational Sessions of that Convention that will be hosted by the AES's Midwest Regional Council, first regional host of an AES national convention in the Society's fifty-two year history.

Members present at the meeting besides the Board Chairman and Rodney Leeds, Board Secretary, were: Dr. Henry Brown, Robert A. Ehrhardt, Dr. Henry L. Kellner, James H. Lindsay, George J. Marotta, Gerald A. Lux, Edward E. Oberland, Dr. Joseph V. Petrocelli, William H. Safranek and Dr. Edward B. Saubestre.

Non-members present by invitation besides Mr. Andrus were Charles Levy, Boston Educational Program Co-Chairman; Hubert H. Foley, Boston Branch President; Louis V. Gagnon, Boston Convention General Chairman and Dr. George P. Swift, Boston Convention Co-Chairman.

ARCHITECTS OF AES NATIONAL CONVENTION EDUCATIONAL PROGRAMS AHEAD

Left to right: George J. Marotta, Boston Convention Educational Chairman; Charles Levy, Boston Convention Educational Co-Chairman; Dr. Gerald Kissin, Boston Convention Symposium Chairman; Joseph Andrus, Milwaukee Convention Educational Chairman; Vincent Mattacotti, Milwaukee Convention Educational Co-Chairman.

EIGHTH INTERIM MEETING

SUPREME SOCIETY

AMERICAN ELECTROPLATERS' SOCIETY, INC.

STATLER-HILTON HOTEL HARTFORD, CONNECTICUT

FEBRUARY 10-12, 1961

FRIDAY, FEBRUARY 10

9:00 a.m.—Executive Board Meeting *Executive Suite*

8:00 p.m.—Annual Joint Meeting, Executive Board, American Electroplaters' Society (AES) and Board of Trustees, Metal Finishing Suppliers' Association (MFSA) *(To be announced)*

SATURDAY, FEBRUARY 11

9:00 a.m.—Registration, Delegates and Alternate Delegates (AES) *Mezzanine*

10:00 a.m.—Eighth Interim Meeting, Supreme Society, AES *Hartford Room*

1:00 p.m.—Luncheon, Delegates/Alternates, AES (Dutch Treat) *Rooms 408-12-16-20*

2:00 p.m.—Eighth Interim Meeting, Supreme Society, AES *Hartford Room*

5-6:00 p.m.—Reception to Delegates/Alternates, AES

8:00 p.m.—"Old Timers' Night", New England Regional Council and Delegates/Alternates (Dutch Treat) *Saengerbund Hall, 266 Washington St., Hartford, Conn.*

SUNDAY, FEBRUARY 12

9:00 a.m.—Executive Board Meeting *Executive Suite*

RECORD REPRESENTATION OF AES BRANCHES EXPECTED AT EIGHTH INTERIM MEETING

American Electroplaters' Society, Inc. (AES) will conduct the Eighth Interim Meeting of its Supreme Society, governing council of AES, at the Statler-Hilton Hotel, Hartford, Connecticut, Saturday, February 11, 1961, with an expected record number of accredited Delegates and Alternate Delegates present, supplemented by other Branch Representatives. Meeting arrangements are being made in behalf of the Supreme Society by the AES's New England Regional Group, with Allen Ferguson and Richard C. Barrett, both of AES's Bridgeport Branch, as Co-Chairmen.

BOARD TO CONVENE FRIDAY

The actual Supreme Society meeting to be held in the Hartford Room, Saturday, February 11 starting at 10:00 a.m. sharp will be preceded the previous day (Friday, February 10), by a full day's meeting of the Executive Board, and will be reconvened Sunday, February 12.

Moreover, that same Friday evening (February 10), the AES's Executive Board and the Board of Trustees of the Metal Finishing Suppliers' Association (MFSA) will participate in a joint meeting for the fourth annual time. The two bodies will discuss matters of mutual interest.

SUPREME SOCIETY MEETS SATURDAY

Among other features, the Eighth Interim Meeting will receive any documented invitations from chartered AES Branches to host the Society's Fifty-Fourth National Convention (1967) or the Tenth Interim Meeting (1963). It will also hear announcements of proposed candidacies for the Third Vice Presidency of the National Society. Under AES law, Interim Meetings, however, have no power to legislate or to transact official AES business.

SATURDAY'S OLD TIMER'S NIGHT

A feature of that Saturday will be an hour-long reception to Delegates and Alternate Delegates by National Headquarters to occur immediately after adjournment of the Interim Meeting.

As another feature of the Eighth Interim Meeting, the sponsoring AES New England Regional Group will conduct a gala "Dutch Treat" OLD TIMER'S NIGHT at the Saengerbund Hall, Hartford, that same Saturday evening.

Each of the AES New England Regional Group's Branches, namely Bridgeport, Hartford, New Haven, Waterbury and Springfield is reportedly planning to pick its oldest "Old Timer" and sponsor him at the affair. The winning "Old Timer" will be recognized and honored.

AGENDA

EIGHTH INTERIM MEETING

AES

SUPREME SOCIETY

STATLER-HILTON HOTEL

HARTFORD, CONN.

FEBRUARY 11, 1961

1. Welcome by New England Regional Council
2. Welcome by National President
3. Opening of the Session as an Interim Meeting.

   Purpose of the meeting as a sounding board on matters for subsequent consideration and action by the Supreme Society at its Annual Meeting in Boston, June 22, 1961
4. Progress and Status Reports:

   Financial by President

   Educational by First Vice President

   Membership by Second Vice President

   Branch Regionalization, Regional Annual Meetings and Branch Monthly Meetings as Tools of AES Educational Mission by Third Vice President

   Honorary, Merit and Achievement Awards as Inducements for Greater AES Service by Immediate Past President.

   Headquarters and AES Publishing and Public Relations by National Executive Secretary

   AES Research Program by Chairman, Research Committee
5. Preliminary Reports:

   a) Executive Board Appraisal as to AES Financial Structure

   b) Executive Board Recommendations for AES Constitutional and/or Bylaw Amendments If Any

   c) Membership Promotion (Membership Committee Chairman)

   d) Sustaining Member Promotion (Vice Chairman for Finance, Research Committee)
6. AES National Conventions and Interim Meetings

   a) 1961 Boston Convention (Boston Convention General Chairman)

   b) Other AES National Conventions Ahead

   c) Eighth Interim Meeting, Hartford (General Chairman)

   d) Ninth Interim Meeting, Indianapolis

   e) Report of Outcome of Los Angeles Convention

   f) Progress Report on St. Louis Industrial Finishing Exposition (1964)
7. Invitations from Branches to Host 1967 National Convention or 1963 Interim Meeting
8. New Business Brought for Discussion by Delegates
9. Announcement of Candidates for Third Vice Presidency
10. Adjournment

FUTURE MEETINGS

Education is the business of AES. For National, Regional and Branch educational and other AES meetings ahead, see PLATING's section titled FUTURE MEETINGS herein.

TEMPORARILY CHARTERED SAN DIEGO BRANCH NAMES FIRST OFFICERS

The San Diego (California) Branch, AES's temporarily chartered Branch, stepped forward in its preparations for applying to the Executive Board for a permanent AES Branch charter by electing its Branch Officers to guide its progress to hoped-for Permanent Charter, then lead it thereafter as the sixtieth chartered Branch of the Society.

As its first Branch President, the neophyte Branch elected Harry C. Steinke of the Electrolab Printed Electronics Corp. George Loch was named Vice President and Stanley L. Townsend, Treasurer. Richard De La Cruz, Floyd Nick Carter and James Gregory were elected to the Board of Managers, and Walter J. Dornbusch, Jr. was voted Branch Secretary.

The proposed Branch's monthly meetings are held each Tuesday (preceding the month's second Wednesday) at Calabreses Restaurant on Pacific Highway, San Diego. The meetings start at 8 p.m. following a 7 p.m. dinner.

AES LAPEL BUTTONS

The AES member's handsome sterling silver lapel button can be purchased from your Branch Secretary at $1.38 per button including tax. These, in turn, can be purchased by Branch Secretaries from National Headquarters at that amount. The silver Branch Past President's button can be purchased by Branch Secretaries from the National Office at $1.43 per button including tax.

For cleaning these sterling silver buttons, here is one expert member's reported method, "Place hot water in which a little washing soda has been dissolved into an aluminum pan or any container with a small piece of aluminum at bottom (concentration: one tablespoonful of soda to one quart of water). Immerse the button so as to touch aluminum, and allow to soak until tarnish disappears. Operation will clean but will not injure the silver."

Gordon A. Lince

Herbert A. Skelton

TORONTO BRANCH TO STAGE IMPORTANT SYMPOSIUM, MARCH 28

Observing its 49th Anniversary as a chartered Branch of American Electroplaters' Society, Inc. (AES), the Toronto Branch, AES's first international Branch, will conduct its "First Symposium on Metal Finishing" at the Seaway Hotel, Toronto, Canada, on Tuesday, March 28, 1961, a large and expectedly significant full-day educational meeting.

The heralded event will include a morning and afternoon educational program versatile as to the treatment of electroplating and metal finishing subjects by international experts. Among speakers already programmed will be Cleveland F. Nixon, General Motors Corporation, and a Past AES National President; Clarence H. Sample, International Nickel Company and Dr. A. Kenneth Graham of Graham, Crowley & Associates. The meeting's Luncheon Session will be addressed by a prominent Toronto executive. Fuller details will be carried in PLATING MAGAZINE's March issue.

Founded and chartered in 1912, the AES's Toronto Branch is a contemporary of AES's Detroit and Chicago Branches. It was followed into AES being by AES's present four other Canadian Branches, namely Montreal (1921); Western Ontario (1948); Hamilton (1949) and British Columbia (1957).

President of the Toronto Branch is Gordon A. Lince. Herbert A. Skelton of International Nickel Company is the Symposium's General Chairman.

NEW HAVEN BRANCH TO HOST NEW ENGLAND REGIONAL MEETING

The Twenty-Second Annual New England Regional Meeting will be held at the Hotel Statler in Hartford, Connecticut on April 22, 1961.

The New Haven Branch, headed by its president, Harry Taylor, will be host for the coming Regional. The other member Branches will handle the following functions: Hartford, entertainment, Chairman Walter Dyber; Springfield, education, Chairman Alexander Salmond; Bridgeport, publicity, Chairman William Hyatt Jr.; Waterbury, advertising, Chairman William Giesker.

Mr. Salmond has requested each Branch to poll its membership to ascertain choices of technical subject matter in an endeavor to select topics and speakers that will round out an interesting educational program.

The social program will include special entertainment for the ladies while the educational program is in progress, excellent food, intriguing entertainment, dancing and good fellowship.

TECHNICAL PROCEEDINGS REPRINTS AVAILABLE FOR PURCHASE IN QUANTITY

For those companies or individuals desiring to purchase a quantity of reprints of any of the copyrighted papers appearing in the 1960 Edition of AES's book TECHNICAL PROCEEDINGS (other than those delivered before the "Hydrogen Embrittlement in Metal Finishing" Symposium of the 1960 AES National Convention), there is a price list available upon request, specifying cost and how to order.

Address your request for information to Thomas W. Lowe, Production Manager, TECHNICAL PROCEEDINGS, American Electroplaters' Society, Inc., American Building, 443-445 Broad Street, Newark 2, N. J.

1960 — 1961
COMPOSITION AND LEADERSHIP
REGIONAL AND BRANCH STRUCTURE FOR PROMOTION OF AES BRANCH MEMBERSHIP, AMERICAN ELECTROPLATERS' SOCIETY, INC.

I AUSTRALIAN REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: Bruce Leslie, Victoria, Australia

1. ADELAIDE: D. McNamara, Dunleath, So. Australia
2. MELBOURNE: Ian W. Rose, Glen Ormond, Victoria, Australia
3. SYDNEY: Clive J. Jones, Revesby, N.S.W., Australia

♦

II DIXIE REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: George W. Taylor, Adel, Georgia

4. BLUE RIDGE: Carl A. Witherspoon, Blacksburg, Virginia
5. MEMPHIS-MIDSOUTH: James R. Lee, Memphis, Tennessee
6. MIAMI: Earl Kennedy, Miami, Florida
7. SOUTHEASTERN: Vince L. Cashen, Carrollton, Georgia

♦

III EASTERN CANADIAN REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: Stanley A. Frost, Verdun, Quebec, Canada

8. HAMILTON: Bruce Connolly, Hamilton, Ontario, Canada
9. MONTREAL: Bruce B. Millward, Longueuil, P.Q.
10. TORONTO: Roan H. Clark, Toronto, Ontario, Canada
11. WESTERN ONTARIO: Robert T. Dobson, Watford, Ontario, Canada

♦

IV EMPIRE STATE REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: John J. Bunsic, Binghamton, New York

12. BUFFALO: John G. Donaldson, Warren, Pennsylvania
13. CAPITOL DISTRICT: Edwin Frieberg, Albany, New York
14. MOHAWK VALLEY: Theodore Duvall, Utica, New York
15. ROCHESTER: Charles B. Fideor, Rochester, New York
16. SYRACUSE: Edwin C. Elliott, Geneva, New York
17. SOUTHERN TIER: Bruce Wells, Endicott, New York

♦

V KEYSTONE STATE REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: J. E. Cogan, Philadelphia, Pennsylvania

18. ALLENTOWN-READING: Homer Ressler, Bethlehem, Pennsylvania
19. LANCASTER: George H. Geesey, York, Pennsylvania
20. PHILADELPHIA: Irvin K. Hauseman, Pottstown, Pennsylvania
21. PITTSBURGH: Richard E. Woehrle, Steubenville, Ohio

♦

VI METROPOLITAN REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: Manuel Ben, Oak Park, Michigan. (Protem)

22. NEW YORK: Jack Weiner, Fresh Meadows, L. I., New York
23. NEWARK: A. Korbelak, Nutley, New Jersey
24. BALTIMORE-WASHINGTON: Lancaster Lowry, Mt. Ranier, Maryland

♦

VII MIDWEST REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: George E. Parisho, Bettendorf, Iowa

25. CHICAGO: Rudy J. Hazucha, Chicago, Illinois
26. MILWAUKEE: Arthur M. Linn, Kenosha, Wisconsin
27. MISSISSIPPI VALLEY: Wilbur F. McKay, Hampton, Illinois
28. ROCKFORD: Charles Miner, South Rockford, Illinois
29. ST. JOSEPH VALLEY: Jack W. Petersen, South Bend, Indiana
30. ST. LOUIS: Homer P. Thomen, St. Louis, Missouri

♦

VIII NEW ENGLAND REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: Robert D. Martin. Denver, Colorado (Protem)

31. BOSTON: F. Wayne Martin, Belmont, Massachusetts
32. BRIDGEPORT: William Lindsay Jr., Orange, Connecticut
33. HARTFORD: Stanley Grabowski, Bristol, Connecticut
34. NEW HAVEN: Edward R. Jorczyk, Bridgeport, Connecticut
35. PROVIDENCE-ATTLEBORO: C. L. Capobianco, No. Providence, Rhode Island
36. SPRINGFIELD: Louis E. Dupuis, Fairview, Massachusetts
37. WATERBURY: Louis Porretti, Waterbury, Connecticut

♦

IX SOUTHWESTERN REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: Myron E. Browning, Fort Worth, Texas

38. DENVER: Robert L. Whyman, Denver, Colorado
39. DALLAS-FT. WORTH: Robert F. Howard, Forth Worth, Texas
40. HOUSTON: Dale E. Chapman, Houston, Texas
41. KANSAS CITY: William E. DesJardins, Leawood, Kansas
42. PHOENIX: James E. Weaver, Scottsdale, Arizona
43. WICHITA: Max Brinnon, Wichita, Kansas

♦

X TRI-STATE REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: M. Lester Reynolds, Indianapolis, Indiana

44. CLEVELAND: Gordon Carlson, Elyria, Ohio
45. COLUMBUS: Charles Kayser, Columbus, Ohio
46. CINCINNATI: Gerard H. Poll Jr., Cincinnati, Ohio
47. INDIANAPOLIS: Stephen O'Connor, Indianapolis, Indiana
48. DAYTON: Lawrence H. Hadlock, Dayton, Ohio
49. LOUISVILLE: James R. Smith, Louisville, Kentucky

♦

XI WEST COAST REGIONAL MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: L. Truman Stoner, Norwalk, California

50. BRITISH COLUMBIA: William T. Kilby, Vancouver, British Columbia
51. LOS ANGELES: Emmett Babcock, Pomona, California
52. PORTLAND: (Notification Awaited)
53. SAN FRANCISCO: Stanley Bammann, Palo Alto, California
54. SEATTLE-PUGET SOUND: Thomas Quirk Gorton, Mercer Island, Washington

♦

XII WOLVERINE STATE MEMBERSHIP PROMOTION GROUP

REGIONAL CHAIRMAN: Irvin M. Weiss, Grand Rapids, Michigan

55. CENTRAL MICHIGAN: R. K. Martin, Grand Rapids, Michigan
56. DETROIT: Edward J. Kubis, Wyandotte, Michigan
57. GRAND RAPIDS: Orville D. Hoxie, Grand Rapids, Michigan
58. SAGINAW VALLEY: Francis J. Reha, Detroit, Michigan
59. TOLEDO: Julius Bach, Toledo, Ohio.

REMINDERS TO AES CHARTERED BRANCHES

Your Branch's 1960-1961 fiscal year membership expansion quota is 10% over the number of your Branch's members in good standing as at June 30, 1960, meaning 10% more members than your Branch membership on July 1, 1960 before any subsequent suspensions or resignations for 1960-1961 Per Capita Tax purposes.

♦

Your Branch, through its President of record, has been invited to nominate any member of the Society whom it chooses for consideration for the Charles Henry Proctor Memorial Leadership Award for 1960-1961. Signed by both your Branch President and Branch Secretary, your nominating return sheet is due in the hands of the National Executive Secretary by not later than April 1, 1961, accompanied by SEVEN copies of a resume of your nominee's 1959-1960 deeds upon which the nomination is being predicated.

♦

If your Branch is among those very few Branches that have delayed to now in appointing a Branch Research Finance Chairman to spearhead your Branch's effort to stimulate Sustaining Membership applications by industrial companies in your area, with the help of the Regional Research Finance Chairman for your territory, please do so promptly and submit his name to the National Executive Secretary's office at earliest possible time for processing.

BRANCH MEMBERSHIP EXPANSION DRIVE IN PROGRESS WITH BLUE RIDGE BRANCH LEADING AT HALF-WAY

With all AES chartered Branches targetted to a minimum 10% membership expansion in 1960-1961 over and above the total number of their members in good standing at July 1, 1960, an aggressive Societywide Membership Expansion Campaign is in progress, and a number of Branches are nearing their respective minimum 1960-1961 quotas.

Pursuant to AES Bylaws, the leadership of Branch membership enlargement at Branch level is vested in the Branch First Vice Presidents, and these responsible Branch officers are listed in the Manning Table for the 1960-1961 Branch Membership Expansion Campaign that appears on the adjoining page of this issue of PLATING MAGAZINE.

For purposes of the 1960-1961 drive, each of AES's 59 American, Canadian and Australian Branches has been geographically classified by Campaign Region or Area. And to coordinate and assist the First Vice Presidents of Branches within these Campaign Districts, a member of the 1960-1961 National Membership Committee has been assigned as Regional Chairman.

Results at the halfway mark (January 1, 1961) of the 1960-1961 fiscal year (July 1-June 30) as manifested in the Society's Branch Membership Expansion Competition for that period find the Boston Branch leading in the First Division; the San Francisco Branch ahead in the Second Division and the Blue Ridge Branch in first position in the Third Division.

Those Branches ahead on June 1, 1961 will be declared winners in their respective divisions. Each will be presented with a $50.00 cash award at the Supreme Society Annual Meeting to be held at Boston, June 22, 1961 plus, of course, attendant recognition in PLATING MAGAZINE.

At the six-month point, leaders in AES's respective Branch Competition Divisions were:

JOHN J. BUNSIC
(Southern Tier Branch)
CHAIRMAN
1960-1961 AES NATIONAL MEMBERSHIP COMMITTEE

Branch Membership Competition

(as of December 31, 1960)

BRANCH	Members July 1, 1960	New Members	Net Change Membership (See Note)	Per Cent Change
FIRST DIVISION (126 members and Over)				
1. Boston	149	20	+18.0	12.1
2. Waterbury	136	8	+ 5.5	4.04
3. Los Angeles	340	17	+ 8.0	2.35
SECOND DIVISION (70-125 members)				
1. San Francisco	87	20	+21.5	24.71
2. Sydney	92	13	+13.0	14.13
3. St. Louis	113	9	+ 6.5	5.75
THIRD DIVISION (10-69 members)				
1. Blue Ridge	41	20	+18.5	45.12
2. Portland	23	9	+ 2.0	7.14
3. Western Ontario	29	1	+ 2.0	6.90

NOTE: Includes all membership changes, including elections, reinstatements, resignations, suspensions, etc. for the six-month period.

BROADER RESEARCH PROGRAM PARTICIPATION BEING PUSHED VIA AES BRANCH CAMPAIGN

AES's vital Research Program embodying seven Projects in 1960–1961, and recognized internationally for its values in expanding knowledge of the arts and sciences of plating and metal finishing, is sustained financially by AES not only by a share of each Active Member's annual Per Capita Tax and of each Member-at-Large's annual dues but also, and mainly, by the annual dues of each Sustaining Member company. At fiscal year-end June 30, 1960, AES had some 350 such Sustaining Memberships and these were credited for existence to some 42 of AES's 59 Branches, Chicago with 65 and Detroit with 63 then leading the roster. Seventeen AES Branches were then responsible for none, an amazing fact.

There is need, according to the Research Committee, to increase the quantity of Sustaining Memberships sizably so that AES can afford an even greater number of worthy Research Projects in American and Canadian universities and foundations without resorting to Research Fund reserves. To attain them, an intensive Sustaining Membership Expansion Campaign is now in progress under the National Research Committee generally and its Vice Chairman for Finance Raymond L. Mitchell (Mitchell-Bate Company, Waterbury, Conn.) specifically.

The muscles and sinews of the Campaign are AES's Branches, with the generalship of respective Branch campaigns vested in the Branch Research Finance Chairmen now appointed by those Branches listed below. Mission is to inspire as many industrial companies located in Branch communities having a dollars and cents interest in advancements in electroplating, metal finishing, organic coating and allied arts to apply for Sustaining Membership. Cost is $100 per membership.

To coordinate and assist Branch Research Finance Chairmen, the Research Committee has now appointed Regional Research Finance Chairmen and these, at this writing, include:

Australia
Bruce Leslie, Melbourne Branch
Canada
Herbert A. Skelton, Toronto Branch
Dixie
George W. Taylor, Southeastern Branch
Empire State
Frank O. Beuckman, Rochester Branch (Pro Tem)
Keystone State
(To be appointed)
Metropolitan
Robert Duva, Newark Branch
Midwestern
George E. Parisho, Mississippi Valley Branch
New England
Raymond L. Mitchell, Waterbury Branch
Southwestern
Myron E. Browning, Dallas-Fort Worth Branch
Tri-State
Walter E. Moline, Dayton Branch
West Coast
Lawrence M. Henderson, San Francisco Branch
Wolverine State
Edward J. Kubis, Detroit Branch

Every AES Branch is urged to cooperate wholeheartedly in this important 1960–1961 campaign. If a Branch Research Finance Chairman has not yet been appointed, it is urged to appoint a "go-getter" and to notify the National Executive Secretary of the appointment. Each Branch is urged to procure a reasonable quantity from National Headquarters of the AES booklet, "Is Advancement in Electroplating and Metal Finishing Important to Your Company's Future?".

August Mendizza

IMPORTANT TWO-DAY AES RESEARCH CONFERENCE, APRIL 24-25

Plans are rapidly nearing completion for the two-day AES Research Conference to be held at the Bell Telephone Laboratories, Murray Hill, New Jersey, April 24–25, 1961, according to August Mendizza, the AES Research Committee's Conference Chairman for that important coming Society event.

Expected at the Conference will be members of the AES Research Committee, its District Supervisors, its Regional Research Finance Chairmen, its respective Project Chairmen and Directors, ranking executives of AES Sustaining Member companies, former Research Committee Chairmen and many other stalwarts who are substantially interested in the status and progress of the AES Research Program and its respective projects in universities and foundations.

As tentatively programmed, the first day's sessions will hear reports on Projects 12, 13, 14, 15, 16 and 17. The second day will feature treatment of Projects 18, 19, 20 and will hear reports concerning proposed new AES Research Projects. There will also be a round-table discussion on the subject of "Needed Electrodeposition Research." The two-day Conference will conclude with a tour of the Bell Telephone Laboratories.

1960-61 BRANCH RESEARCH FINANCE CHAIRMEN

(AS OF FEBRUARY 1, 1961)

ALLENTOWN-READING BRANCH:
Carl Swartz
BALTIMORE-WASHINGTON BRANCH:
Kenneth M. Huston
BLUE RIDGE BRANCH:
Bruce Wallace
CENTRAL MICHIGAN BRANCH:
Robert C. Taylor
CHICAGO BRANCH:
Clarence Kolzow
CINCINNATI BRANCH:
Charles T. Dumont
CLEVELAND BRANCH:
Gordon Carlson
DALLAS-FORT WORTH BRANCH:
A. C. Fricke
DENVER BRANCH:
William T. Samuelson
DETROIT BRANCH:
John F. Siefen
GRAND RAPIDS BRANCH:
Paul A. Waalkes
HARTFORD BRANCH:
Ralph McCahan
Harry Sanders
KANSAS CITY BRANCH:
William E. DesJardins
LOS ANGELES BRANCH:
William G. Lidtke
MEMPHIS-MIDSOUTH BRANCH:
John H. O'Neal
MILWAUKEE BRANCH:
Ted Sobczynski
MISSISSIPPI VALLEY BRANCH:
John Mohr
MOHAWK VALLEY BRANCH:
Robert A. Stewart
NEWARK BRANCH:
Robert A. Ehrhardt
NEW HAVEN BRANCH:
Dr. Edward B. Saubestre
NEW YORK BRANCH:
Milton Nadel
PHILADELPHIA BRANCH:
Irvin K. Hauseman
PROVIDENCE-ATTLEBORO BRANCH:
Pierre Lonsbury
ROCHESTER BRANCH:
Frank O. Beuckman (Pro Tem)
ROCKFORD BRANCH:
Charles Miner
SAGINAW VALLEY BRANCH:
William D. Snyder
ST. JOSEPH VALLEY BRANCH:
Louis Rague
ST. LOUIS BRANCH:
G. S. Clooney
SAN FRANCISCO BRANCH:
Dominic Maviglia
SOUTHEASTERN BRANCH:
Clem D. Hohner
SPRINGFIELD BRANCH:
Arthur Zavarella
TOLEDO BRANCH:
Merlin Parker
TORONTO BRANCH:
Kergan Wells
WATERBURY BRANCH:
Raymond L. Mitchell
WICHITA BRANCH:
Richard Balbierz

FORTY-EIGHTH ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, INC.

SPONSOR: American Electroplaters' Society, Inc. (AES), American Building, 443-445 Broad Street, Newark 2, New Jersey, and its 59 chartered American, Canadian and Australian Branches.

HOST BRANCH: Boston Branch of American Electroplaters' Society, Inc., itself observing its Fortieth Anniversary as a chartered Branch of AES.

SITE AND HOTEL: Statler-Hilton Hotel, Boston, Massachusetts.

DATES: June 18-23, 1961—in AES's Fifty-Second year. Boston's Mayor has proclaimed this "American Electroplaters' Society Week" in Boston.

ADULT REGISTRATION: For male and female adults—$25 per person, including Banquet, Outing, Boston Pops and all other AES official Convention events.

CHILDREN REGISTRATION: For registered children—$15 per child, not including Banquet or Boston Pops Concert but including three days of supervised sightseeing and children's program events, plus the Outing. Banquet tickets available at $8.50 per child extra. To the extent available, Boston Pops Concert tickets for registered older children, $1.50 per child extra.

HOTEL ACCOMMODATIONS: Order direct via Hotel Reservation Form mailed to all AES members—with a copy, for convenience of stragglers, also to be included in PLATING MAGAZINE (March and April 1961 issues).

CONVENTION GENERAL CHAIRMAN: Louis V. Gagnon, P. O. Box 329, Framingham, Massachusetts.

LADIES CHAIRMAN: Mrs. George Parsons Swift, 40 Colonial Avenue, Waltham 54, Massachusetts.

GRAND OPENING SESSION • EDUCATIONAL PROGRAM • AES BOARD AND COMMITTEE MEETINGS • LADIES PROGRAM • CHILDREN'S PROGRAM • PLANT TOURS • DANCES • SIGHTSEEING • CLAMBAKE • BOSTON POPS CONCERT • SPONSORED RELAXATIONAL PROGRAMS • COCKTAIL PARTIES • GET-TOGETHER • GOLF TOURNAMENT • BANQUET • ENTERTAINMENT • FLOOR SHOW

AES WELCOMED TO BASS STONE AND NOON GLAND

(Transcript of an imagined oral greeting by an imagined Bostonian as it would perhaps sound in Bostonese)

"This is Jonathan Q. Bass Stone speaking concerning the 48th Annual Convention of American Electroplaters' Society, Inc. (AES) to occur in the Bay City, June 18-23, 1961.

"All Bass Stone will be looking forward to taking AES as a bawdy to our hats when it convenes in our fair city next June. In our baas off-ta your arrival, we shall raise alms in toast to you, and the proverbial cap it will shoe ah be spread on the flaw in hattie welcome to you.

"Whether you come from a posture of Eye Oar or a caught age in Alabama—whether you are an alumnus of Have Ud or Yea Ill—whether you come alone or, as a pauper, with your family, including your sons or datas—whether you come by air, train, otto or even horse drawn cat—all of us, including our Governor, our Centaurs, our Mayor will be glad that you have come to Noon Gland—to this front tea ah of science. You will find us patterson in your favor regardless of your political patty—regardless of whether you voted for Richard Nixon and Cabbit Lawge or John Candy and Linen Jantzen.

"Meantime, we shoe ah extend Noon Gland's best wishes, and may no ham, and every good, befall you until we meet in Bass Stone next June. Off-ta you have left, may you look back and hold that it was a top-draw eye dear that motivated you to pick Bass Stone as site of your 48th Annual Convention."

Hearty thanks to Frank B. Gilbreth for permitting PLATING MAGAZINE to draw upon his "Dictionary of Bostonese," Life Magazine, 10/9-15/60 for the creation of this original item

TENTATIVE PROGRAM
FORTY-EIGHTH ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, INC.
STATLER-HILTON HOTEL, BOSTON, MASSACHUSETTS, JUNE 18-23, 1961

SUNDAY, JUNE 18

9:00 a. m.	Executive Board Meeting (All Day)	AES Headquarters Room
1:00–8:00 p. m.	Registration	Mezzanine
2:00 p. m.	Honorary Membership Award Committee Meeting	Room 418
2:00 p. m.	AES Scientific Achievement Award Committee Meeting	Room 410
3:00 p. m.	Ladies Program Tea of Welcome	(To be Announced)
4:00 p. m.	Credentials Committee Meeting with Executive Board	Headquarters Room
8:00 p. m.	AES Get-Together Party	Grand Ballroom

MONDAY, JUNE 19

8:00 a. m.-9:00 p. m.	Registration	Mezzanine
10:00 a. m.	Grand Opening Session	Grand Ballroom
11:00 a. m.	Business Meeting Supreme Society	Grand Ballroom
12:00 noon	Branch Secretaries' Luncheon	Parlor A
12:15 p. m.	Speakers' Luncheon	Parlor F
12:30 p. m.	Ladies Luncheon (Followed by Tour of Boston)	Bay State Room
2:00 p. m.	Opening Educational Session (The William Blum Lecture)	Grand Ballroom
2:30 p. m.	Editorial Board Meeting	Parlor C
2:30 p. m.	Educational Session A (Research)	Grand Ballroom
	1. Research Committee Chairman's Presentation	
	2. Research Project No. 14—"A Microscopic Study of Chromium Plating"	
	3. Research Project No. 15—"Progess Report on the Development of Corrosion Tests for the Performance of Plated Coatings"	
2:30 p. m.	Educational Session B (Organic Finishing)	Georgian Room
	4. "Functional Vinyls Go Decorative"	
	5. "Overcoming Organic Finishing Problems"	
	6. "New Epoxy Primer-Acrylic Lacquer Finish System"	
4:00 p. m.	Order of Past Presidents Meeting	Hancock Room
6:00 p. m.	Order of Past Presidents Dinner	Hancock Room
8:00 p. m.	MFSA Ball	Grand Ballroom

TUESDAY, JUNE 20

8:00 a. m.	Charles Henry Proctor Memorial Leadership Award Selection Committee Breakfast	Room 418
8:00 a. m.	Speakers' Breakfast	Parlor F
9:00 a. m.–12:30 p. m.	Registration	Mezzanine
9:00 a. m.	Educational Session C (Finishing of Light Metals Symposium)	Grand Ballroom
	7. "Nickel-Chromium Plating Upon Anodized Aluminum"	
	8. "Chemical Conversion Coating for Aluminum Alloys"	
	9. "Outdoor Exposure of Anodic Coatings on Aluminum: Effect of Sealing"	
	10. "The Effect of Voltage During Anodizing of Aluminum"	
9:00 a. m.	Membership Committee Meeting	Room 436
9:00 a. m.	Public Relations Committee Meeting	Room 438
9:00 a. m.	Publications Committee Meeting	Room 437
9:00 a. m.	Educational Committee Meeting	Room 440
12:00 noon	Joint Educational Committee and Branch Librarians Luncheon	Parlor A
12:00 noon	Speakers' Luncheon	Parlor F
1:00 p. m.	Ladies Luncheon (Castle Hill, Crane Estate, Ipswich, Mass.)	Busses from Statler Hotel
2:00 p. m.	Educational Session D (Finishing of Light Metals Symposium)	Grand Ballroom
	11. "Plating on Magnesium by Electrodeposition and Chemical Reduction Methods"	
	12. "Anodizing or Conversion Coating of Magnesium"	
	13. "Chromic Acid Anodizing of Beryllium" (Part I)	
	14. "Chromic Acid Anodizing of Beryllium" (Part II)	

TUESDAY, JUNE 20 (continued)

2:00 p. m.	Individual AES Regional Council Meetings (If Any)	(To be Announced)
4:00 p. m.	AES Regional Group and Council Chairmen's Meeting	Room 442
4:30 p. m.	Finishing of Light Metals Forum	Grand Ballroom
8:30 p. m.	"Fun with Fiedler" at Boston Pops	Boston Symphony Hall

WEDNESDAY, JUNE 21

8:00 a. m.	Research Committee Breakfast	Hancock Room
8:00 a. m.	Speakers' Breakfast	Parlor F
9:00 a. m.–12:00 noon	Registration	Mezzanine
9:00 a. m.	Educational Session E	Grand Ballroom
	15. "Quality Control Study to Determine Optimum Conditions for Barrel Plating in Zinc Cyanide Solutions"	
	16. "The Practical Application of Statistics to Quality Control of Electroplated Products"	
	17. "Overcoming the Limitations of Electroforming—A Progress Report"	
9:00 a. m.	Educational Session F	Georgian Room
	18. "The Anodic Behavior of Metals in Cleaning Media—Copper and Its Alloys"	
	19. "Production Nickel Plating on Molybdenum"	
	20. "Improved Adhesion of Electroless Nickel Plating on Titanium Alloys"	
9:00 a. m.	Research Committee Meeting	Hancock Room
12:00 noon	Speakers' Luncheon	(To be Announced)
1:30 p. m.	AES Annual Outing (Clambake at Historic Plymouth, Mass.)	Buses from Statler Hotel

THURSDAY, JUNE 22

8:00 a. m.	Speakers' Breakfast	Parlor F
9:00 a. m.	Business Meeting, Supreme Society	Bay State Room
9:00 a. m.	Educational Session G	Grand Ballroom
	21. "Precious Metal Plating and Solderability"	
	22. "Recent Developments in the Use of Electroplating in the Additive Method of Printed Wiring Manufacture"	
	23. "Stoichiometry of Copper Bonding Using Copper Oxide"	
9:00 a. m.	Educational Session H	(To be Announced)
	24. "Corrosion Current Data for Nickel-Chromium Couples"	
	25. "Dual Chromium Plating of Zinc Die Castings"	
	26. "Objectives in Corrosion Protection of Bright Decorative Trim and Their Implementation"	
12:00 noon	Speakers' Luncheon	(To be Announced)
2:00 p. m.	Business Meeting, Supreme Society	Bay State Room
2:00 p. m.	Educational Session I	(To be Announced)
	27. "Plating of Printed Circuits with Pyrophosphate Copper and Tin-Nickel"	
	28. "Evaluation of Solderability of Electroplated Coating"	
	29. "Producing Ultra High Frequency Electronic Parts by Electroless Copper and Precious Metal Plating of Plastics"	
6:00 p. m.	MFSA Cocktail Party	Georgian Room
7:00 p. m.	AES Farewell Banquet	Grand Ballroom

FRIDAY, JUNE 23

8:00 a. m.	Presidents' Breakfast to National Officers and their Families	Parlor C
9:00 a. m.	Executive Board Meeting	AES Headquarters Room

(This is a TENTATIVE PROGRAM as of January 1, 1961. Additions and modifications will be made monthly until finalized.)

INTERSOCIETY NEWS

Photo courtesy of Products Finishing.

MFSA officers and trustees at Detroit meeting. (Left to right) M. M. Beckwith, joint-hospitality committee chairman; J. A. Cairns, trustee; R. M. Norton, third vice president; Ezra A. Blount, executive secretary; Fred P. Green, president; John E. Trumbour, treasurer; H. L. Kellner, second vice president; E. L. Combs, trustee; King Ruhly, trustee; H. J. McCracken, trustee.

MFSA TRUSTEES MEET IN DETROIT

The officers and trustees of the Metal Finishing Suppliers' Association, Inc., met in Detroit on December 3 at the Statler Hilton Hotel.

One of the many subjects discussed by the trustees was that of the Trade Survey Program, currently carried on under the sponsorship of the Association. Manufacturers report to an independent agency (Price-Waterhouse) the sales of various kinds of products, and the cooperating companies receive from the agency reports of total sales of those same products.

Among other business, the trustees noted that the Memphis-Midsouth Branch of the AES had been granted a Permanent Charter, and thus qualified for the MFSA Thomas A. Trumbour Award.

Next meeting of the MFSA trustees will be held in the Statler-Hilton Hotel, Hartford, Conn., on February 11. The trustees will meet informally with the Executive Board of the American Electroplaters' Society on Friday, February 10.

PURDUE WASTE CONFERENCE SET FOR EARLY MAY

The 16th Purdue Industrial Waste Conference will be held on May 2, 3, and 4, 1961. The meetings will be in the Purdue Memorial Center, Purdue University, Lafayette, Indiana.

There will be approximately 50 papers presented on subjects dealing with industrial wastes and their treatment.

Hotel reservations can be made at the Purdue Union Club, Van Orman Hotel, Cedar Crest Hotel, Morris Bryant Motor Hotel, Esquire Motel, Devon Plaza Motel or Howard Johnson Motor Lodge.

Everyone is welcome. Registration blanks will be mailed upon request to the conference chairman, Dr. D. E. Bloodgood, professor of sanitary engineering, School of Civil Engineering, Purdue University, Lafayette, Ind.

♦

VACUUM METALLURGY CONFERENCE SPONSORED JOINTLY WITH NYU

The New York University has announced that the fifth annual conference on vacuum metallurgy is to be held June 26–27, 1961 at the University Heights Campus of New York University. The conference is now jointly sponsored by the American Vacuum Society and New York University under the chairmanship of Dr. R. F. Bunshah.

♦

JEFFERS HEADS GWI STANDARDIZATION COMMITTEE

Henry J. Jeffers, sales manager of Carborundum's Bonded Abrasives Division, was elected chairman of the standardization committee of the Grinding Wheel Institute.

Mr. Jeffers and his committee will develop and recommend standards and nomenclature for bonded abrasives to facilitate their manufacture, procurement, and application. The abrasive industry manufactures over 100,000 various kinds, sizes and shapes of bonded abrasives each month.

FOULKE CHOSEN VICE CHAIRMAN OF NTTCIW

At the annual meeting of the National Technical Task Committee on Industrial Wastes held in Washington, D. C., on December 15 and 16, 1960, Dr. D. Gardner Foulke was elected vice chairman. Dr. Foulke is research director of the Sel-Rex Corporation, Nutley, New Jersey, and is 1960-61 chairman of the AES Research Committee.

A. R. Balden of the Chrysler Corporation, Detroit, was elected chairman of Task Group IV, General Industries. Daniel W. Cannon of the National Association of Manufacturers, New York City, was selected as vice chairman of this Task Group.

Preceding the meeting of Committee on Industrial Wastes, the National Conference on Water Pollution took place in Washington on December 12–14, with 1150 persons in attendance. The principal recommendations presented to the Conference for review and discussion were: 1) The goal of pollution abatement is to protect the capacity of water resources to serve the widest possible range of human needs. 2) Planning for the comprehensive development of each major river basin or water resource area should be established as a fixed national policy which will integrate water quality control with all water resource development. 3) A more systematic approach to the evaluation of water pollution problems is needed which will include health, esthetic, and market values. 4) The Public Health Service should assume leadership, in collaboration with other public and private agencies, in the collection, compilation and distribution of pertinent data on the toxicity of water contaminants. 5) Adoption of a national credo is needed to stress these points: a) users of water do not have an inherent right to pollute; b) users of public waters have a responsibility for returning them as clean as is technically possible; and c) prevention is as important as the control of pollution.

♦

NAMF ADMITS WESTERN PENNSYLVANIA AFFILIATE

The Western Pennsylvania Association of Metal Finishers, an organization of job metal finishing firms in the Greater Pittsburgh area, has been admitted into the National Association of Metal Finishers (NAMF). This announcement was made by NAMF president, Robert L. Giesel of Chicago.

Formation of the Western Pennsylvania group took place on December 2 at Pittsburgh's Penn-Sheraton Hotel when a charter was presented to Andrew Benko

• *NEW SPARKLER HORIZONTAL PLATE FILTERS . . .*

REDUCE PITTING, ROUGHNESS, BUFFING COST AND REJECTS

• Improved plating is assured . . . even with interruption of flow . . . with the new Sparkler Horizontal Plate Filter which uses the unique wash-off cartridge.

Additional advantages gained with this filter that affect bath quality and costs are:

- Horizontal cake stability keeps costs down, but flow and clarity up over the filter life
- Low operating cost — minimum time and powder for precoating
- Fast cleaning, minimum down time — spent cake can be sluiced from plates in less than 5 minutes
- Wash-off or disposable media cartridge can be used in same tank
- Ample cake space for carbon treatment
- Compact — minimum floor space; even largest units may be portable

There's no easier way you can get high plating bath quality for reduced pitting, roughness, buffing cost and rejects than by using the new Sparkler Horizontal Plate Filter with the wash-off cartridge! Get the complete technical data by writing for the new plating brochure.

SPARKLER FILTERS

SPARKLER MANUFACTURING CO.
Conroe, Texas
Sparkler International Ltd. manufacturing plants in: Ontario, Canada, Holland, Australia, Italy, Brazil, Mexico.

FILTRATION ENGINEERS EXCLUSIVELY FOR OVER 36 YEARS

251

Andrew Benko 3d, left, president of new NAMF affiliate Western Pennsylvania Association of Metal Finishers, receives charter from NAMF President Robert L. Giesel. Saul Green, seated, is treasurer of the 16th affiliate of NAMF.

III, president of the new affiliate, who heads Pittsburgh Quality Plating Company.

Charter members of the WPAMF include Pittsburgh Quality Plating Co., Cowan Manufacturing Co., East Liberty Electroplating & Refinishing Co., Electroplating Inc. of Pittsburgh, Jersey Chrome Plating Co., Keystone Rustproofing, Inc., all of Pittsburgh; Metal Ox Anodizing & Finishing, Inc., Braddock; Erie Plating Co., Erie; and American Plating Co., Inc., Zelienople.

According to the NAMF's announcement, the new NAMF affiliate, one of 16 which belong to the parent association, has embarked upon a drive to contest a Pennsylvania Board of Finance and Revenue ruling making it mandatory for job metal finishers to pay a four per cent tax on all materials used in the finishing process, retroactive to 1956. A court "test case" involving one of NAMF's local member firms, Erie Plating Co., resulted in a favorable decision last year, which is being appealed by the Board of Finance and Revenue to the Dauphin County Court.

♦

INCO AND BELL LABS MEN WIN NACE AWARDS

H. R. Copson, International Nickel Company Research Laboratory, Bayonne, N. J., will receive the Whitney Award and Kenneth G. Compton, Bell Telephone Laboratories, Inc., Murray Hill, N. J., will be presented the Speller Award during the 17th Annual Conference and 1961 Corrosion Show of National Association of Corrosion Engineers at Buffalo, N. Y., March 13–17. The Willis Rodney Whitney Award is given in recognition of public contributions to the science of corrosion. The Frank Newman Speller Award is given in recognition of public contributions to corrosion engineering.

Dr. Copson, Whitney Award recipient, has been a NACE member since 1947. He is author of nine technical papers published in *Corrosion* magazine, official NACE publication, and has presented lectures at several NACE regional conferences and short courses. He also has written more than 600 internal company reports and contributed chapters to several books on corrosion.

Mr. Compton, recipient of the Speller award, also has been active in NACE since 1947. Author of 12 technical papers published in *Corrosion*, he has served as chairman of the NACE Intersociety Corrosion Committee and has been a member of several NACE technical committees. He also has been active in corrosion work in other societies, the ASTM, the Electrochemical Society and the American Electroplaters' Society.

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PAPERS INVITED FOR VACUUM SYMPOSIUM

Submission of papers for presentation at the Second International Congress on Vacuum Technology, is invited by the American Vacuum Society. Deadline for abstracts (plus two-page summary) is April 1, 1961. Abstracts should be sent to L. E. Preuss, program chairman, Edsel B. Ford Inst., Henry Ford Hospital, Detroit 2, Michigan.

♦

"IDEA CENTER" THEME OF WESTERN METAL CONGRESS

More than 200 exhibiting firms and 32 important technical sessions will introduce new metal working ideas and developments March 20–24 at the 12th Western Metal Congress and Exposition in Los Angeles.

An impressive array of exhibits will be staged in Pan-Pacific Auditorium and adjacent pavilion. Technical sessions in Ambassador Hotel will be presented by the sponsoring American Society for Metals and six other prominent engineering organizations.

The six are U. S. Air Force, Aerospace Corp., Metallurgical Society of AIME, American Society for Testing Materials, Society for Nondestructive Testing and Society of Aerospace Materials and Process Engineers.

An important ASM-Air Force Luncheon, sponsored by the Society's Los Angeles Chapter, will inaugurate the Metal Show. Maj. Gen. O. J. Ritland, commander, U. S. Air Force Ballistic Div., Inglewood, Calif., will speak.

Dinner-dance plans are in hands of Fred H. Currie, district representative, Trent Tube Co., Room 201, 1901 West 8th St., Los Angeles, 57. As entertainment chairman, he is taking reservations for the affair to be held in the Ambassador's Cocoanut Grove.

"Idea Center for Industry West" is the theme of the Congress and Exposition. Admission-invitations, entitling holders to free registration for the exposition, are being distributed by ASM to members of western sections of more than 40 cooperating technical societies. Admission-invitations may also be obtained from one of the many exhibiting firms in the Metal Show.

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DESIGN ENGINEERING SHOW FIRST TIME IN DETROIT

The Design Engineering Show, taking advantage of the opening of Cobo Hall, will move to Detroit for the first time in 1961. The exposition and the concurrent conference will take place May 22 through 25.

The machine design division of the American Society of Mechanical Engineers will sponsor the conference for the sixth consecutive year.

The show will be the largest in its history and will occupy all available space in the huge hall. More than 400 companies will exhibit.

Newly-opened Cobo Hall, with its unusual construction and advanced design, will permit a spectacular presentation of hundreds of exhibits in a five-acre area virtually free of columns or pillars.

The hall is only a five to ten minute walk from major hotels. It is in the heart of the downtown area and overlooks the Detroit River, directly across from Windsor, Ontario. The number of Canadian visitors is expected to reach an all-time high.

Show hours will be from noon to 5:30 p.m. each day except Tuesday when it will remain open until 10 p.m. to permit those who cannot attend during business hours to see the show.

The area of discussion in the conference will be greatly expanded. A number of extra sessions are being planned to permit more intensive consideration of several aspects of design engineering.

Both show and conference are devoted to the research and development aspects of new products of all types. Materials and component parts for virtually every kind of manufactured product, from everyday household items to space ships, will be shown.

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VACUUM COATERS TO HOLD TECHNICAL CONFERENCE

The fourth annual technical conference of the Society of Vacuum Coaters will be held at the Conrad Hilton Hotel in Chicago, March 1 and 2, 1961. The first day will be devoted to general business and committee sessions—the second, to two concurrent technical sessions, one for functional vacuum coating, the other for decorative applications.

At a luncheon meeting W. Strickland of Simpson Optical Manufacturing Company will present an up-to-date picture of European optical coating, followed by M. A. Self of Bee Chemical Company speaking on present day European decorative vacuum coatings.

INDICATE A 223. ➤

LEA

ABRASIVE FINISHING METHODS

STAINLESS STEEL and STEEL

STAMPINGS • CASTINGS • FORGINGS • SPINNINGS

Stainless steel is harder than carbon steel commonly used for forming and on most occasions more time is required to produce a selected finish on stainless steel than the same finish on steel. However, for normal application, the same general procedures are utilized.

Although much progress has been made in the finishing of stainless steels and carbon steel, the production of mirror and high luster finishes is still not easy and the costs are fairly high. On the other hand, attractive semi-bright satin and butler finishes can be obtained at a cost no greater than that required for producing this same finish on other metals. Today, satin or butler finishes are produced on a wide variety of steel or stainless steel articles, the choice being due to the great difference in the cost of production between this type of finish and the high luster finish. Some of these steels, both carbon and stainless, undergo work hardening and physical transformation at relatively low temperatures, thereby complicating polishing and buffing operations.

POLISHING...Polishing is usually done on sewed muslin, canvas, solid leather, sheepskin or felt wheels or abrasive belts at speeds of 6000-8000 sfm. Sometimes five or six polishing operations are employed. The shallower the surface imperfections are, the less coarse need be the first wheel operation and the easier the subsequent removal of scratches left by this wheel. On fairly good surfaces, only one or two of the polishing wheel operations should be necessary. For some types of stainless steel and steel products these operations may be considered a final finish. Polishing wheels may be prepared with **Lea Gripmaster Polishing Wheel Cement** or **Lea Plasti-Glue** and loose abrasives. Liquid **abrasive mixtures** such as **Leabrament** or **Lea Plasti-Brade** are also used in preparing polishing wheels. Lubrication or greasing a polishing wheel or belt can be done with **Lea Lubar** (bar lubricant) or **Lea Liqualube** (liquid lubricant).

FLEXIBLE POLISHING...On curved or irregular surfaces of steel, or stainless steel, flexible polishing with **Grade "E"** or **Grade "E2" Lea Compound** at 6000 sfm on a sewed buff sized with **Ad-Lea-Sive** is used in place of conventional fine set-up wheels to prepare the surface for subsequent cut-down buffing.

SATIN FINISHING...To produce a final satin finish on articles fabricated from rolled stainless steel with good surface characteristics, **Grade "E"** or **Grade "N" Lea Compound** is used on a loose or pocketed type muslin buff at 4500-5500 sfm. In fabricating products from prefinished stainless steel having standard mill finishes, welded or formed areas sometimes require a coarse satin finish to simulate or blend in with the mill finish. **Lea Greaseless Compound Grades 1-K-2 or 1-K-7** are used with **Lea String Wheels** to simulate #3 or #4 mill finishes.

BUTLER FINISHING...To produce this final finish showing no surface defects, use **Grade "B-31" Lea Compound** with **Grade 316 Learok** as a lubricating agent on a sewed, loose or pocketed type muslin buff at 5500 sfm.

BRIGHT FINISHING—(Bar Compositions)...After intermediate flexible polishing with **Lea Compound,** a bright-finish is produced with **Grade 306** or **316 Learok** on a pocketed type buff at 10,000 sfm. For color, use **Grade 302C** or **309 Learok** on the same type wheel and at the same speed.

BRIGHT FINISHING—(Liquid Compositions)...After intermediate flexible polishing with **Lea Compound** or if the stainless steel has a surface in fairly good condition to serve as a base for bright finishing, **Lea Liquabrade** is used.

Grades FH77J or FU49S Liquabrade will cut down minor imperfections and give some color. **Grade UF57A Liquabrade** is for cut and color and recommended where fairly bright finishes are required.

Grade UH20A Liquabrade gives the highest color and is generally used for the last buffing operation.

Speeds of 8000 to 10,000 surface feet per minute are recommended. Ventilated, sewed or loose buffs can be used.

BLENDING AND SIMULATING MILL FINISHES ON STAINLESS STEEL

One current production method for blending in weld marks and removal of tool or die marks is as follows:

The weld bead is first ground down with a #4 grit disc, then with a portable belt machine using an 80 grit belt. The area around the weld is then finished to simulate a #4 mill finish and is produced with **Grade 1-K-2 coarse grit Lea Compound** on a 6" dia. string wheel operated by a heavy duty flexible shaft machine. **Lea Compound** is applied to the string wheel and allowed to dry approximately 5 minutes. The string wheel is then placed against the surface of the stainless steel in a straight line motion to keep the scratch pattern as uniform as is possible. The final operation involves the use of a polishing log made up of **Lea String Wheels** making a total face width of approximately 24". These string wheels are mounted on a shaft with ball bearing handles. After **Grade 1-K-2** is applied to the polishing log, coated thoroughly and dried adequately, two men hold the polishing log and satin finish the entire surface on large areas of the stainless steel item in **one uniform operation.** This **Lea Satin Finish** produced with **1-K-2 Lea Compound** directly on the original 2-B mill finish simulates quite closely the desired #4 mill finish. A periphery speed of 1350 surface feet per minute is used.

Burring, Buffing, Polishing, Lapping, Plating and Spray Finishing . . . Manufacturers and Specialists in the Development of Production Methods, Equipment and Compositions. Manufacturers of Lea Compound and Learok . . . Industry's quality buffing and polishing compounds for over 30 years.

The Hallmark of Quality Products

THE LEA MANUFACTURING CO.

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Lea-Michigan, Inc., 14459 Wildemere Ave., Detroit 38, Mich.
Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road, Scarborough, Ontario, Canada
Lea Mfg. Company of England, Ltd., Buxton, Derbyshire, England
Lea-Ronal, Inc., Main Office and Laboratory: 139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

Are you interested in plating specialties? SEE THE OTHER SIDE OF THIS INSERT

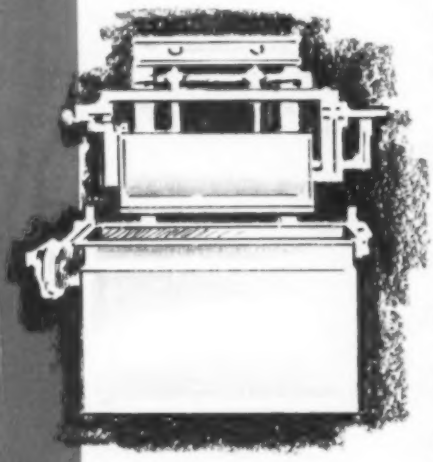
ABRASIVE FINISHING
STAINLESS STEEL & STEEL

announcing

NEW HIGH SPEED barrel brass process

Now, as the result of extensive research, Lea-Ronal offers the brass plater a new, simple, economical, high speed barrel brass plating solution that deposits a uniform lustrous brass color, obtainable in a wide range of operating conditions.

Specifically, this new Lea-Ronal process offers these advantages:



1. **elimination of guess work in barrel brass plating**
2. **permits doubling, even tripling, present production schedules, with existing equipment**
3. **permits this production step-up without encountering problem of non-uniformity of color**
4. **uniform color over wide plating range (0-50 amp./sq.ft.)**
5. **Operating temperature range of 100-140°F**
6. **rapid deposition—rates up to 0.001 inches per hour, depending on barrel and load**
7. **easily controlled, no guessing, chemical addition made on a prepared salt basis.**

If you are now in or planning for barrel brass plating; you should investigate thoroughly this new Lea-Ronal process—another in the extensive list of successful formulations now in wide industrial use. Check with our local distributor or with our technical service department.

The LEA GROUP
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Lea-Ronal, Inc., Jamaica, N. Y.
Lea-Michigan, Inc., Detroit
The Lea Mfg. Co., Waterbury, Conn.
Lea Mfg. Co., of Canada, Ltd.
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Plating Polishing Buffing Burring

Lea-Ronal Inc.

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Main office and Laboratory:
139-20 109th Avenue, Jamaica 35, N. Y.

Are you interested in Buffing, Polishing and Burring Specialties? **SEE OTHER SIDE OF THIS INSERT.**

INDUSTRY NEWS

NEW FACILITIES FOR WAYNE PRODUCTS

Wayne Products Corp. announces that new facilities are being built at 623 W. Colfax Street in Palatine, Ill. This is a part of a program to extend and improve service. Wayne manufactures filters designed expressly for the plating industry.

♦

SEL-REX AND MEAKER HOLD SALES SEMINAR

A three-day sales seminar for the sales and marketing personnel of Sel-Rex Corporation and its subsidiary The Meaker Company, was held recently at the Motel On The Mountain, Suffern, New York. According to S. S. Wilson, vice president—sales, seminars of this type will be a regular feature of Sel-Rex sales training because they provide an opportunity for representatives from all over the country to develop a team spirit, in addition to the exchange of ideas and technical information.

Speakers and their subjects at the sales seminars included: E. C. Rinker, vice president and technical director, who spoke on new applications and markets for Sel-Rex's precious metal electroplating processes; J. Ross, assistant general manager, Meaker Company subsidiary, who told the meeting that new markets for Meaker automatic metal finishing equipment had developed for the processing of electronic components on a mass production basis; and Sid Mitwol, general manager, Electrical Division, Meaker Company, who unveiled new developments in semiconductor rectifier equipment initiated by his division. Morris M. Messing, president of both companies, who welcomed the representatives at the opening night banquet, was assisted by Mr. Wilson in a presentation of Sel-Rex-Meaker plans for expansion for 1961.

PLATING MAGAZINE TECHNICAL ARTICLE REPRINTS AVAILABLE

To maintain PLATING MAGAZINE's high standard, each and every technical article that you read in PLATING has been critically appraised and approved by a panel of experts on that specific subject before PLATING acceptance for publication.

If desired, you can, at nominal cost, order a quantity of reprints of any published PLATING technical article. Minimum order is 100 copies. Ask for further, fuller purchase details, including cost. In this connection, write or call Thomas W. Lowe, Production Manager, PLATING MAGAZINE, American Building, 443-445 Broad Street, Newark 2, N. J.

BARRETT CHEMICAL REGISTERS TRADE MARK

The Barrett Chemical Products Company, Inc., Shelton, Connecticut, has been granted trade mark registration No. 707,662 by the U. S. Patent Office for Sulfamate Plating Solutions and Compositions, namely, plating solutions, replenishment solutions, acid compounds, anti-pit agents, and other addition agents used in sulfamate processes.

The mark consists of elements representing a chemical flask and stopper, with suspended solution therein.

♦

METAL & THERMIT FORMS SWISS SUBSIDIARY

Metal & Thermit Corporation has formed a wholly owned subsidiary in Zug, Switzerland to increase its participation in the growing European market, it was announced by H. E. Martin, president.

The new subsidiary, Metal & Thermit AG, will act as the parent company's sales and licensing representative in Europe. It will also license its own patents and trademarks.

Dr. Hartmut Richter will be associated with the Swiss subsidiary as technical director. He was formerly European technical representative for M&T. Metal & Thermit AG, will be a part of M&T's International Division, headed by Charles H. Carpenter, Jr.

♦

NORTHWEST CHEMICAL ACQUIRED BY CHEMETRON

Chemetron Corporation of Chicago, has acquired, for cash, Northwest Chemical Company of Detroit.

Northwest Chemical Company's plant and offices will remain at 9310 Roselawn, Detroit. Harold J. McCracken, B. F. Lewis and Helen M. Morell are the officers and founders of the firm and will continue in charge of operations.

Northwest Chemical Company becomes a part of the Chemical Products Division of Chemetron. Other units of the division are Dunham Chemical Company, Crestwood Chemicals, Girdler Catalysts, Holland Color and Chemical Company, Rock Hill Research Laboratory, Specific Pharmaceuticals and Charles J. Weigel, Inc.

♦

G. S. EQUIPMENT ANNOUNCES PRODUCTION FACILITIES

The G. S. Equipment Co. has acquired complete product development and manufacturing facilities. The announcement was made by Thomas R. Gill, president.

The firm will now develop and manufacture its entire product line in a modern, well-equipped plant at 15583 Brookpark Road, Cleveland 35.

INFORMAL SESSION OF RECENT SEL-REX SALES SEMINAR, AND BANQUET

(Left) Sid Mitwol, newly appointed vice president and general manager, Electrical Division, The Meaker Company, subsidiary of Sel-Rex Corporation, tells Sel-Rex sales personnel about new developments in semiconductor rectifier equipment initiated by his division. (Right) Sel-Rex sales and marketing personnel from all over the country photographed at banquet held during their recent three-day sales seminar at the Motel On The Mountain, Suffern, New York.

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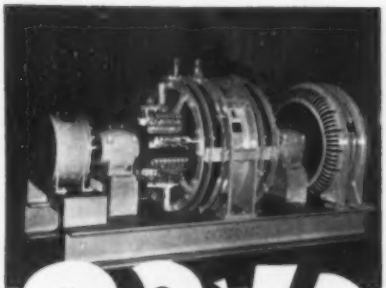

Save

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MOTOR
GENERATOR SETS

These motor generator sets have been re-manufactured in the Chandeysson plant by specialists who use the same methods and materials that are used to build new Chandeysson generators. They will provide "like-new" service for 25 years or more, yet cost far less than new generators or rectifiers.

Plating and anodizing motor generator sets with synchronous motor drives and direct connected exciters.

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5000/2500 AMPERES, 12/24 VOLTS
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V61-2

WYANDOTTE BUILDING NEW PLANT

Ground was broken November 16 for the new Wyandotte Chemicals Corporation, J. B. Ford Division plant in Scarborough Township, near Toronto, Ontario.

The new plant will manufacture the complete line of Wyandotte cleaning, washing and sanitizing products.

The manufacturing portion of the plant will occupy some 48,000 square feet. An office of 4000 additional square feet is also provided. The site will accommodate additional plants for expected growth. Wyandotte products have been sold in Canada for more than 40 years.

PLATRONICS HOLDS OPEN HOUSE AT NEW PLANT

Platronics, Division of Palumbo Bros., Inc., unveiled what is said to be the country's largest plating facility for electrical electronic components, during "Open House" at their new, specially designed building, at 500 Commerce Road, Linden, New Jersey.

The more than 300 technical and purchasing executives who attended were treated to a guided tour of the expansive production facilities, including the spacious research and development laboratory reported to be unique in the electroplating industry. Visitors were also shown the pilot plant.

Platronics, whose parent company was formed in 1915, is establishing new precedents for "job shop" electroplaters by serving customers in many states throughout the country—from coast to coast. John Palumbo, secretary and general manager, comments: "The success we've enjoyed to date, and that which we are confident will follow, is due to decades of cumulative technical experience which we are actively marketing to the electronics industry coast to coast."

♦

LEA APPOINTED SALES AGENT FOR WESTINGHOUSE ULTRASONIC EQUIPMENT

The Lea Manufacturing Co. of Waterbury, Connecticut has been appointed a sales agent for Connecticut, Western Massachusetts and Northern New York for Westinghouse ultrasonic cleaning equipment.

The Waterbury firm, headed by Earle W. Couch, is a manufacturer of industrial abrasive compositions and electrochemical processes. It will handle all lines of Westinghouse ultrasonic cleaning equipment, produced at the company's industrial electronics department in Baltimore, Maryland.

Mr. Couch said the ultrasonic cleaning equipment will offer firms in his territory the fastest, most thorough and most economical method for removing unusually difficult substances.

Westinghouse ultrasonic cleaning systems have neither moving parts nor tubes and the equipment size has been reduced 200 per cent while the weight has been cut 300 per cent through the use of solid state devices, Mr. Couch noted.

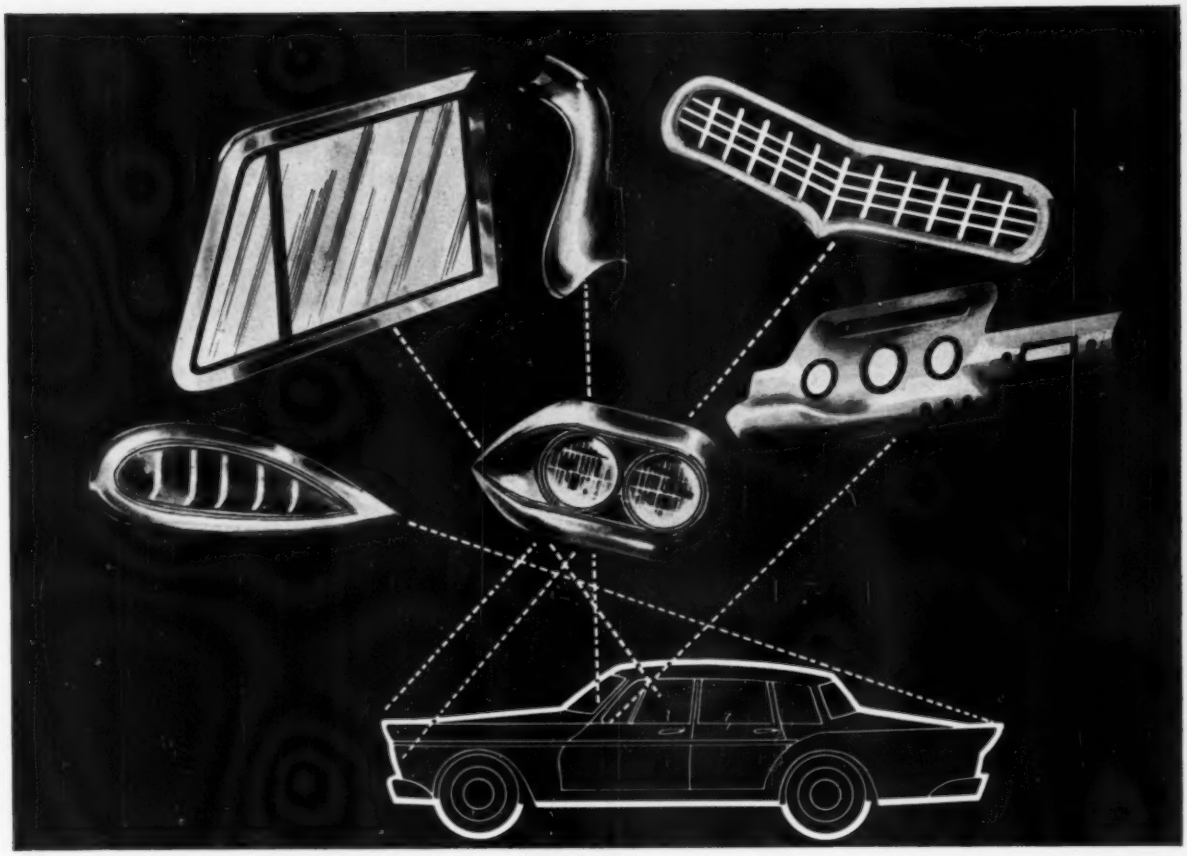
Each system, he said, consists of an ultrasonic generator featuring the 50 per cent more efficient solid state Trinistor circuit and a stainless steel transducer-tank electrically matched to the generator.

♦

MUNKACSY ACQUIRES G. S. PLASTICS

William A. Munkacsy, president of The G. S. Plastics Company (The General Synthetics and Plastics Co., Inc.), has acquired full ownership by purchase of all outstanding shares of that corporation. The firm recently moved and is now in operation at new general offices, laboratories and plant at 1300 Brookpark Road, Cleveland 9, Ohio.

The acquisition includes all shares owned by The General Supply Company. T. R. Gill, formerly an officer, has resigned and is no longer affiliated.



Aluminum adds the bright touch

"Bright dip" aluminum parts and trim bring a high note of glamour to the graceful lines of modern automobiles. Practical, easily-formed aluminum appears as mirror-bright radiator grilles, body trim, window molding, light bezels, and a growing list of other parts.

"Bright dipping" is a chemical polishing process that dissolves the microscopic high points of a metal's surface faster than its low points. Thus, a few minutes' dip in the solution smoothes and thereby polishes aluminum parts to a high lustre. Then they are anodized for protection against wear and corrosion. This unique polishing process—also used with copper, brass and stainless steel—is becoming part of the manufacture of a long list of products extending from automobiles to zippers.

The major ingredient in "bright dip" solutions is phosphoric acid, one of the many phosphorus chemicals produced by Virginia-Carolina Chemical Corporation. V-C Phosphoric Acid, made from elemental phosphorus from V-C's own phosphate mines, is known for outstanding quality and purity. All three grades exceed American Chemical Society, National Formulary, and Food and Drug Regulations requirements where applicable.

V-C Phosphoric Acid	85% N.F. Grade	80% Food Grade	75% Food Grade
Sp. Gr. (20°/4°C)	1.691	1.635	1.581
Lbs./gal.	14.1	13.6	13.2
P_2O_5	61.71%	58.08%	54.50%
H_3PO_4	85.21%	80.20%	75.26%
Cl	0.0001%	0.0001%	0.0001%
Fe	0.0002%	0.0002%	0.0002%
Pb	0%	0%	0%
As_2O_3	0%	0%	0%

FREE BOOKLET "Bright Dip Hints" and samples available. V-C specialists, drawing on years of "bright dip" experience, are happy to give you detailed information in terms of your own operation. Write today!

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Use

KOCOUR TEST EQUIPMENT
TO SOLVE YOUR
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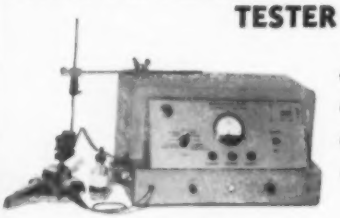

- direct reading
- virtually automatic
- 90-95% accurate
- simple operation

Wide Application Range!
Determines the thickness of brass, cadmium, decorative and heavy chromium, copper, lead, lead-tin, nickel, silver, tin, tin-zinc, and zinc deposits on various basis-metals. The thickness range is from 2–3 millionths up to 0.002". In addition, composite coatings can be tested. You get individual readings of the *actual* thickness of each deposit.

You can also test deposits on wire with Accessory Unit Model WT. (A.S.T.M. Spec. B-298-55T for testing silver coated copper wire.)

Dependable Accuracy!
Accuracy is 90–95%. Human error is virtually eliminated. A positive "Calibration" feature monitors both accuracy and performance.

Simple operation!
Just set up the specimen and press a button. The average test takes about 1 minute . . . readings are direct.

15 Day FREE trial!
Try it in your own plant for 15 days. See for yourself how it works . . . what it does . . . how well it suits your application. Your satisfaction is guaranteed.

FREE Evaluation of application
Just send us full details concerning your application including the plating basis metal combinations and thickness range of each . . . or, just write for Bulletin 400. There's no charge . . . no obligation.

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INDUSTRY NEWS BRIEFS

ACCQUISITION OF CLARK-COOPER BY FREDERIC B. STEVENS ANNOUNCED

Frederic B. Stevens, Inc., has announced the acquisition of Clark-Cooper Co., Inc., Palmyra, N. J., manufacturer of flow metering pumps, moderator controls and audible signal equipment.

"The acquisition," says Clyde Reeme, president of Stevens and its parent company, The Udylite Corp., "is the latest step in a diversification program planned to adjust the company's yearly output to seasonal demands through the opening of additional markets.

"Immediate plans call for the expansion of Clark-Cooper's facilities for manufacturing pumps. The basic product line will remain the same, with the addition of new models, scheduled for introduction in the near future."

Clark-Cooper's manufacturing facilities have been moved to a plant owned by Stevens in Springfield, Ohio. Sales, distribution personnel and the headquarters, however, will remain in Palmyra.

Rex A. Taylor, former president of Clark-Cooper, has been elected a vice president of Frederic B. Stevens, Inc. and will direct the operation of the new Clark-Cooper Division.

In addition to the acquisition of Clark-Cooper, Stevens has purchased new facilities in Wallingford, Connecticut and Buffalo, and has added the manufacture of new products in the Foundry, Metal Finishing and Building Materials Divisions.

♦

FIRESTONE STEEL USES NEW PLATING PROCESS FOR WHEELS

A new corrosion-resistant plating for wheels is being tested by the Firestone Steel Products Company.

M. A. DiFederico, president of the division, announced that tests to date on the new electroplating process show it to be superior to paint finishes now used on truck and bus wheels.

"We believe this new plating will last four to five times as long as present finishes and will save fleet owners more than 50 per cent in refinishing and maintenance costs over the life of the wheel," Mr. DiFederico said.

Since it is not a coating, this new finish cannot chip or rust and makes the wheel impervious to corrosion from road salt and other acids.

Manufactured at the company's Wyandotte, Michigan, plant, the entire wheel is plated in the new Firestone process.

♦

WHITFIELD CHEMICAL BUILDS NEW PLANT

The main offices and manufacturing facilities of Whitfield Chemical Company are now at 9100 Freeland Ave., Detroit 28, Michigan. This new plant is located on a 3½-acre site with railroad siding and five loading docks. It contains 20,000 square feet of manufacturing and storage space, and is designed primarily for the manufacture of metal cleaning chemicals. New and improved laboratory and research facilities are included.

♦

VITRO ACQUIRES PECHINEY INTEREST IN SUBSIDIARY

Vitro Corporation of America has purchased all minority interest in its chemical subsidiary held by Pechiney, French industrial chemical leader.

In addition to purchasing all stock and notes held by Pechiney, Vitro has entered into a new royalty agreement. It will run until December 31, 1974, and gives Vitro exclusive United States and Canadian rights to all present and future Pechiney process and product patents involving rare earth chemicals, metals, alloys, and related compounds.

Vitro Chemical Company has manufacturing operations at Chattanooga, Tenn., and Salt Lake City, Utah.

PATENT ABSTRACTS

DR. D. GARDNER FOULKE
SEL-REX CORPORATION
Nutley, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

2,955,027, 10/4/60—DEBURRING ZINC-BASE DIE CASTINGS—I. Newell and E. Walen, Wethersfield, Conn.

Zinc die castings can be deburred in an aqueous acid bath containing 1 to 11 liters in solution 110 to 350 g of chromate, 32 to 150 g of nitrate, 28 to 120 g of a radical consisting of borates, formates, acetates, propionates, and butyrates, 32 to 180 g of a radical selected from a group of fluorine compounds selected from fluorides, fluoborates, and fluosilicates, 16 to 30 g of a radical taken from the group of strong mineral acid radicals such as sulfates, phosphates and sulfamates.

6 claims.

2,955,061, 10/4/60—COATING ZIRCONIUM—H. Jenkins and D. Freeman, assignors to The Parker Rust Proof Co., Detroit, Mich.

A conversion coating for zirconium is produced in a fluoride, potassium, nitrate ion bath.

5 claims.

2,955,078, 10/4/60—ELECTROLYTIC PROCESS—B. Raynes, assignor to Horizons Titanium Corp., Princeton, N. J.

A fused salt method for producing Ti, Cb, V and Ta from fused salts is described.

6 claims.

2,955,957, 10/11/60—COATING METALS—H. Dorner, assignor to Interchrome, S.A., Geneva, Switzerland.

A method for coating a ferrous metal with chromium by diffusion is claimed.

3 claims, figure.

2,955,965, 10/11/60—CLEANING TIN PLATE—C. Coleman, assignor to U.S.A. Army.

To remove organic coatings on tin plate immersion in a hot solution of aniline, ammonia and water.

7 claims.

2,955,992, 10/11/60—BRIGHT COPPER PLATING—E. Laue, assignor to MacDermid Inc., Waterbury, Conn.

A process for producing decorative or protective uniform bright copper plate in a current density range of 1 to 75 asf, which consists essentially of electroplating copper at a current density of 1 to 75 asf from a copper cyanide plating solution containing as the only compound which has a brightening effect upon the copper plate within said current density range an inorganic selenium compound in which selenium has a valence of less than +4, in amount equivalent to 0.00008 to 0.0032 gram per liter of selenium, while applying interrupted current where the plating phrases are longer than 1 second and shorter than about 60 seconds and the interruption phases reduce polarization with removal of less than 10 per cent of the deposit of the plating phases.

10 claims.

THE WONDER BAR #7225

A NEW PRODUCT of PROGRESS by ARDCO

The wonder bar #7225 was so named by our customers—job shops—industrials big and small—all tell us the same story—you can cut and color buff with outstanding performance any structural form of brass-bronze—copper—zinc and aluminum. Think of it—only one compound required to finish all this variety of metals.

THE WONDER BAR #7225

For further information contact

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Our years of experience in the Fiberglass field combined with the most modern methods of production have made possible low cost fiberglass tanks at large savings to you. These tanks are of the finest quality. The materials used have proven their outstanding resistance to acid attack. Special sizes are now available at no extra mold charges.

Protective Plastic Co. Fiberglass tanks are chemically resistant throughout their thickness. They will not scratch, tear, or peel.

We produce a complete line of Fiberglass rectangular tanks, round tanks, Fume ducts, stacks, hoods and fittings. Consult us on your corrosion problems.

PROTECTIVE PLASTIC CO.
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USE READER SERVICE CARD; INDICATE A 229.

TRADE LITERATURE

L—201. VAPOR RECOVERY—A completely new, patented process for the recovery of usable solvent from vapors usually lost during degreasing and cleaning operations, has been announced by the Industrial Division of Vic Manufacturing Company and is described in their Brochure No. 219.

Vic's vapor recovery system captures solvent vapors evaporating during degreasing and cleaning operations, by ducting them into a specially designed tank with a bed of activated carbon . . . returning clear, reusable solvent after a steaming and decantering process. The systems are available in 11 different automatic and manual models.

L—202. COPPER STRIPPER—A new liquid chromate-type material for stripping (etch removal) copper from printed circuits is fully described in Technical Data Sheet No. 115, a three-page usage and instruction sheet prepared by MacDermid Incorporated.

Called Metex Circuit Etch B, the new product is claimed to contain a catalyst to give it a high stripping rate and is designed with a high capacity to dissolve copper. Metex Circuit Etch B is said not to attack lead-tin, gold, rhodium or inks. It may be used in spray, splash or immersion equipment. The product is stable both at room and elevated temperatures, and no heat or activation is required.

L—203. FILTER—Newly available from Croll-Reynolds Engineering Co. is an eight-page brochure about the ClaRite filter and its operation.

Two factors together make the ClaRite filter unique: 1) exclusive construction including various components of precise design, and 2) the design of the 'Wedgwire' tubular filter element—the heart of the system. The mechanical strength and the thermal shock resistance of this 'Wedgewire' filter aid retaining element (described and illustrated in the brochure) are claimed to be far in excess of any known requirements.

L—204. NICKEL SULFAMATE PROCCESS—Hanson-Van Winkle-Munning Company offers the metal finishing trade a 16-page technical instruction bulletin describing the company's Nickel Sulfamate process, the bath suitable for heavy build-up for metal resizing, electroplating, electroforming and other functional uses.

Four features are: Mechanical properties of deposits are controllable; the liquid concentrate solution is chloride free; solution is premixed—no dry chemicals to dissolve, except nickel chloride, when desired. Solution is easy to control.

The bulletin illustrates (with microphotographs and charts) and completely describes solution preparation for both still and barrel operations, effects on deposits of using various proportions of solution's constituents, effective temperatures, current densities and voltage requirements; purification methods; analytical procedures for constituents; equipment and materials needed to successfuly operate the nickel sulfamate bath.

L—205. BURNISHING COMPOUND—Clepo 150-NP, a new development in the field of tumbling compounds was recently announced by Frederick Gumm Chemical Co. This new liquid burnishing compound contains no soap and consequently is said to produce surfaces with high lustre even in plants where hard water is used. In addition, burnished metal surfaces are more readily electroplated without the usual hazards of soap-film interference.

The new compound is used for ball burnishing aluminum diecastings but does not require a pre-etch treatment in strong acids or alkalies to obtain a brilliant, silvery finish. It produces bright surfaces on brass, phosphor-bronze and beryllium copper alloys during self-tumbling without the problem of caking in recessed areas and blind holes that is normally experienced with powdered burnishing compounds. Additional information in Technical Bulletin 1060 is available on request.

L—206. VACUUM OVENS AND BAKE SYSTEMS—Tempcor product catalog, from Temperature Engineering Corporation, contains 30 pages. This illustrated product catalog describes "VacU-Therm" vacuum ovens, diffused "Aer-Heet" chambers, "Sola-Jet" radiant ovens, dri-box vacuum bake systems, modular controlled atmosphere enclosures, and vacuum equipment.

The catalog contains illustrations, descriptive drawings and technical specifications.

L—207. ULTRASONIC CLEANERS—A new two-color sheet illustrating and describing the Ultra-Clean '320' Series of ultrasonic cleaners has just been published and is available free, it was announced by L & R Manufacturing Company.

The sheet contains illustrations and cutaway diagrams of the '320' (with one 1¼ quart transducerized tank and one 1¼ quart rinse tank), the '320D' (with two 1¼ quart transducerized tanks with selector switch) and the '320L' (with one 3-⅜ quart transducerized tank). Complete specifications on each model are also included.

L—208. FILTER CARTRIDGE—A bulletin MW-100 describing the new Micro-Wynd disposable filter cartridges for filtering plating solutions, chemical process streams and many other fluids, has just been issued by the Cuno Engineering Corporation. The bulletin describes the patented Micro-Wynd manufacturing process by which a separate filtering medium is interwoven between the structural spiral windings, on a perforated metal core.

Performance advantages, user test reports, micron densities, fluid compatibility and other specifications are included.

L—209. PH METER—The Beckman Zeromatic *p*H meter, a line-operated, drift-free instrument for making precise pH or millivolt measurements, is described in a new bulletin published by the Scientific and Process Instruments Division of Beckman Instruments, Inc.

The Zeromatic, designed for use in any laboratory where fast, accurate *p*H measurements are required, measures over the full 0 to 14 *p*H range and offers direct millivolt readings to ± 1400 mv.

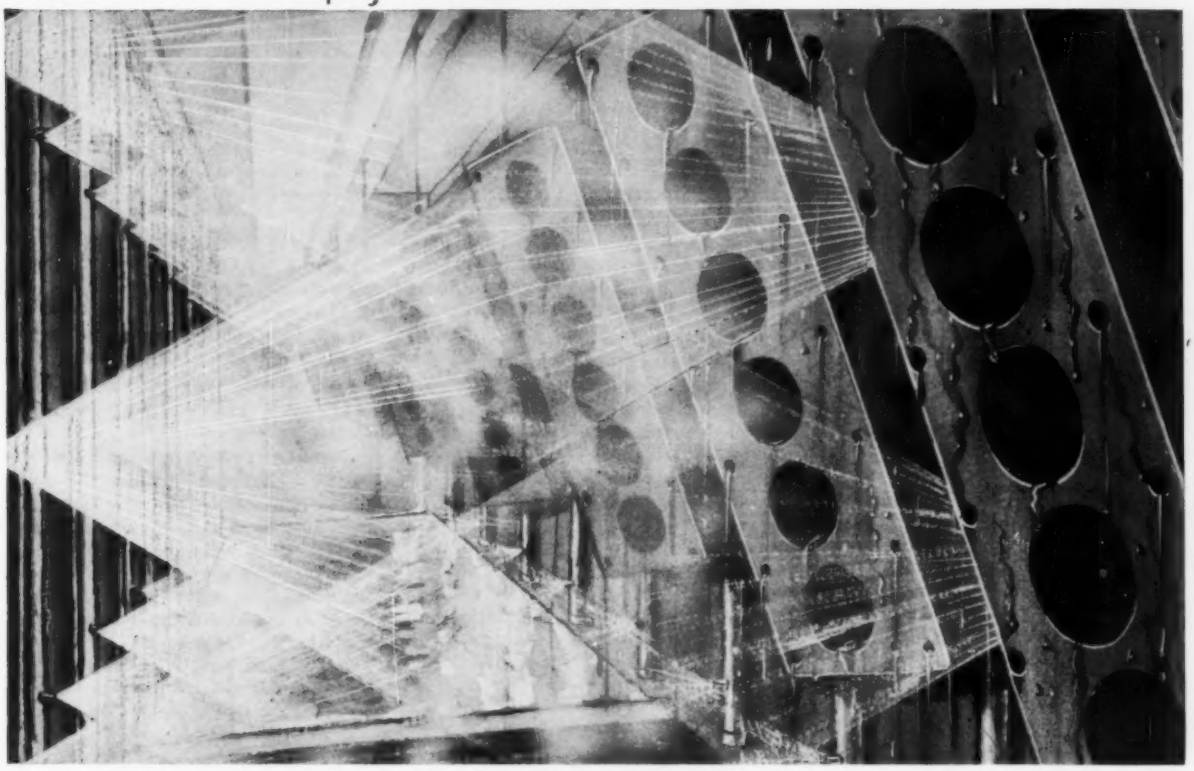
L—210. RUST REMOVER—Tested and proved procedures for preventing and removing rust under almost any conditions are detailed in Service Bulletin No. 16B, issued by Oakite Products, Inc.

The bulletin covers such common industrial problems as the safe removal of rust from raw stock by the use of inhibitors or inhibited acid compounds; prevention of hydrogen embrittlement during rust removal by the use of alkaline derusting agents; the simultaneous removal of rust and grease while conditioning surfaces for painting; the prevention of rust between processing operations, and during periods of storage; the washing of parts by machine or tank immersion with simultaneous protection against rust; and anti-rust conditioning of steel in preparation for painting.

To get more from your spray washer

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 FIELD SERVICE MEN • OVER 160 MATERIALS



New Oakite 198 sprays off soils fast... protects in-process parts from rust

Users tell us that nothing equals Oakite 198 for cleaning parts in-process. Here's why they think so:

- *It clears off heaviest soils at temperatures up to 180°F, and light soils at room temperature.*
- *Metal chips wash away under its action.*
- *When dry it leaves a protective film that prevents the rusting of machined or ground parts prior to assembly—yet it doesn't affect accurate gauging.*

Now largely used in automotive plants, Oakite 198 is proving its economy as well as its unique effectiveness in providing fast, smut-free cleaning plus rust protection. It works in single or multistage machines, at economical concentrations.

Oakite 198 is just one of a complete line of Oakite materials for machine cleaning. There are non-foaming solvent agents for heaviest duty cleaning, alkaline cleaners for removing moderate to light soils. When you ask Oakite you can be sure of getting a cleaning compound designed to give you best possible results, designed to reduce your "per unit" cost. You can be sure, too, of getting prompt, intelligent in-plant service from your local Oakite man.

Send for Bulletin. Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.

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50 1909-1959 SCIENCE

years' leadership in industrial cleaning

EQUIPMENT AND SUPPLIES

E—201. BUFF—The Monobuff, a new dual-purpose cut-and-color buff announced by Midwest Buff Company, combines fast-cutting characteristics of a sewed or a bias-type buff and the high-coloring properties of a loose buff. Cut and color are combined—eliminating one complete buffing operation. The patent-applied-for construction employs a double row of wide, overlapping blades. Overlapping blades cut aggressively yet are said to provide soft wiping action, too. The buff may be rotated in either direction.

E—202. QUENCHING COMPOUND—A special die casting quench developed by Northwest Chemical Company has eliminated scumming, foul odor, chip and dirt floatation and blistering rejects due to water corrosion.

The product, called Four Star Quenching Compound, is usable for both aluminum and zinc castings. It is claimed to require no heating, special tanks or equipment, won't turn rancid, remains stable under production heat build-up and retains its efficiency over many die changes, thus effecting substantial replacement economies.

Four Star leaves a water repellent residue too thin to affect accurate gaging but which prevents oxidation of parts held in storage as long as three months and prevents water oxidation of parts exposed to the elements while awaiting plating.

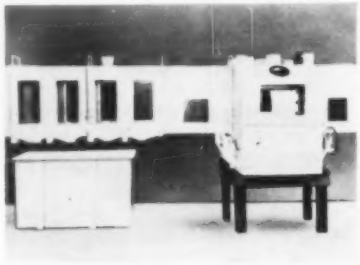
Parts quenched by this method do not require blow-off of redeposited chips and soil after removal from the bath as there is no blanketing foam or scum at operating temperature.

Cleaning of castings prior to plating is greatly simplified and bacteria, dermatitis and odor are eliminated.

E—203. COPPER COATING—The availability of Cuprodine No. 5, a further development in non-electroplated copper coatings, has been announced by Amchem Products, Inc. (formerly American Chemical Paint Co.)

The Cuprodine No. 5 process is said to provide increased coating adherence and efficiency and greater uniformity of color over previous sulfuric acid-copper sulfate formulations when applied to carbon and stainless steel wire and stampings. The thin, adherent copper coating acts as a lubricant on the steel to appreciably reduce scratching of the wire, pickup and wear on dies.

E—204. ETCHING MACHINE—A new, automatic machine for etching printed circuit plates, composed almost entirely of fiberglass-reinforced polyester resin, has been fabricated by Indust, Inc. The



system is said to be fully resistant to corrosion by the cupric chloride etching solution employed. The fiberglass-reinforced polyester resin construction is designed to cut maintenance costs substantially and to eliminate time lost due to repairs.

This new Indust fabrication uses polyester resin even for assembly details which are machined to close tolerances, such as stuffing boxes for drive shafts.

Such members as the stainless steel core drive shafts are also coated with polyester resin, then machined to size.

Essentially, the new automatic system includes a vestibule, etching tank, and a series of chambers where etched plates are drained, rinsed, re-drained and dried. An overhead chain conveyer, operated by a variable V-belt motor drive, moves them forward as the plates are sprayed with cupric chloride which has been tossed into the air by the rotation of 24 fiberglass reinforced polyester resin paddles.

Outlets for water spray have been placed on top of the tanks, and provision has been made for an extra exhaust vent, should it prove necessary in operation.

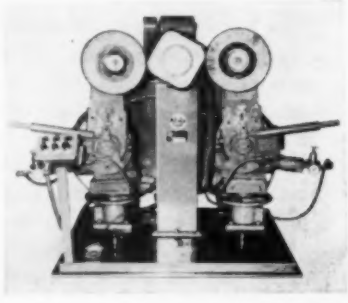
E—205. ALUMINUM ETCHANT AND FEED—A large size drum of AE-16S solid aluminum etchant and a new simplified technique for push-button feed to etching tanks has been developed by Pennsalt Chemicals Corporation. The 600-pound drum of AE-16S was added to the Pennsalt line to serve larger aluminum etching operations.

Developed by Pennsalt Metal Processing technicians, the procedure for more economical and safer utilization of sodium hydroxide etchant is a continuous feed system which requires a minimum of materials. It requires only a pump, standard piping and an ordinary shower head. With the system, aluminum fabricators are said to have exact control of the amount of etchant being added to the tank and can turn the flow of etchant on and off as work loads require.

E—206. BUFFING MACHINE—A new Acme self-contained double-head automatic polishing and buffing machine for finishing round or oval shaped parts or parts of rectangular shape having rounded corners is now available from Acme Manufacturing Company.

This double head machine automatically provides a combination cut and color buffing operation for high luster finishing of parts such as electric fry pans, pots, skillets and metal bowls. Depending on part size, shape and finish desired, production rates of from 60 to 150 finished parts per hour can be achieved on this machine.

One unique feature of the machine is



the automatic control of finishing wheel pressure to suit part configuration requirements. Air line pressure directed to cylinders controlling the wheel contact pressure is automatically varied when contact surfaces change from flat to radius configurations.

E—207. ALKALINE RUST REMOVER—Development of a non-acid, non-flammable rust remover that is claimed to remove rust, carbon, scale, and paint from ferrous metals without the dangers of hydrogen embrittlement or dimensional tolerance loss has been announced by Turco Products, Inc.

Called Alkaline Rust Remover, the product removes heavy rust and stubborn paint deposits such as red oxide primer, baked lacquer, acid-proof paint, and asphalt finishes, by means of a simple one-tank operation followed by a pressure rinse. Alkaline Rust Remover contains no cyanide compounds and emits no corrosive fumes.

E—208. ABRASIVE BANDS—Coated abrasive bands and belts which assume any desired degree of crown when run on inflatable rubber drums have been developed by Behr-Manning Co., a division of Norton Company.

Suited for both stock removal and polishing, these new products are recommended for offhand work in confined areas, and particularly on concave or other contoured surfaces. Their crowned shape eliminates the edge cutting that occurs when a flat band is inadvertently tilted, permits accurate grinding on extremely narrow areas, and diminishes chattering when operated at low pressures.

They are made of aluminum oxide abrasive in grits 40 through 180 on X-weight cloth, bonded with all-resin adhesives.

E—209. IMMERSION RHODIUM BATH—Technic, Inc. has introduced an immersion (electroless) rhodium plating bath. The immersion rhodium is a moderate-priced stable solution which it is said will deposit a tight-grained, pore-free deposit of rhodium on copper or nickel—a five-minute deposit over copper will withstand a 30-minute immersion in a 50 per cent nitric acid solution.

In electroplating, electrical contacts are necessary for each part of the circuit to be plated. In immersion plating these contacts are unnecessary.

An advantage of the new product is that the plate is uniform and extremely thin, thus controlling costs.

E—210. NYLON MESH CONTAINER—A new industrial container, the Niagara nylon mesh container, has been announced. It has applications in a wide variety of technical operations including degreasing, sterilization, washing, ultrasonic cleaning, storage and many others.

Fabricated from high quality industrial nylon into a sturdy drawstring bag, this container offers advantages in terms of long life, chemical inertness, resistance to solvents, flexibility, ease of cleaning and freedom from maintenance and storage problems. Rust contamination from metallic baskets is completely eliminated. They are stocked in a number of meshes and sizes for maximum versatility and can be made to any size, shape, or mesh, according to specifications.

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Rhodium electroplate is suggested for these applications: on wave guides and microwave equipment which may be used in marine atmosphere; in printed circuits; in electrical contacts where light contact pressure and low voltages are involved... Rhodium is very hard and corrosion-resistant.

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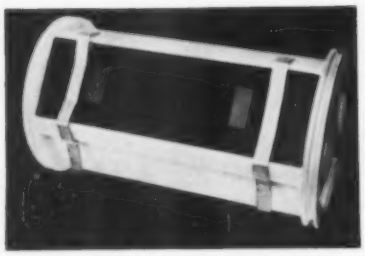


E—211. PLATING BARRELS—New horizontal plating barrels of polypropylene are now offered by Imperial Industries, Inc. The new barrels are equipped with Cycolac doors secured by stainless steel clamps. Models are available for either gear drive or belt drive.

The use of polypropylene results in many advantages. It is light weight (specific gravity .90) yet has greater strength and abrasion resistance. It is claimed to have excellent resistance to heat and chemicals. Virtually indestructible, it stands up under all temperatures and solutions normally encountered in the plating process. The new polypropylene barrels offer low initial cost and long service life. They feature sturdy, all-welded construction.

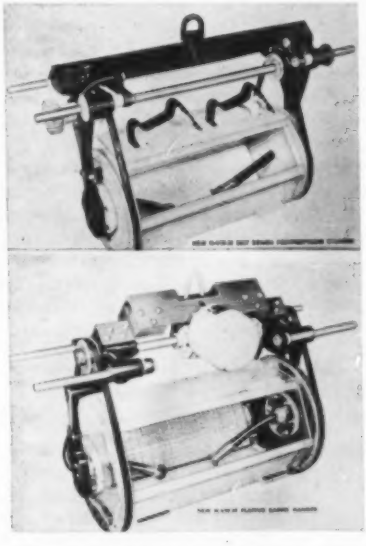
E—212. AIR SANDER DRILL—Their new Model SP-1800, a dual purpose, air-operated sander drill that delivers ¼ hp has just been announced by Superior Pneumatic & Mfg., Inc.

Operated as a sander, the dual purpose uses standard 4 in. discs or buffers—does metal sanding, sheet metal buffing, deburring and light weld scaling, wood sanding, and rust or paint scaling. Used as a drill, the unit takes any standard drill up to ¼ in. Directed air exhaust blows away dust and chips as operator works—keeps job dirt-free.

E—213. BARREL PLATING—H-VW-M announces the successful completion of two new plating barrel improvements. The first is the introduction of a new barrel material, polypropylene. The second improvement is a new type hanger for belt-driven cylinders that allows the operator to replace worn belts by merely snapping the old belt off its pulley and snapping a new one in its place.

The new type hanger leaves the belt pulleys totally exposed and easily accessible. The new pulley arrangement, however, does not impair the standard feature of all H-VW-M barrels, that of keeping all bearings free from contact with hot corrosive solutions.

The Mercil-type polypropylene barrel is one-piece molded, ribless and has all heat



welded joints reinforced with stainless steel screws. Panels are one-half inch and perforated to suit customers' specifications. Inside surfaces are convex to add strength and facilitate tumbling. Polypropylene can withstand plating, cleaning, or acid dipping at temperatures up to 200F.

E—214. BRIGHTENER—A new liquid brightener for zinc plating baths has been developed by the electroplating research staff of Metal & Thermit Corporation. Identified as M&T Zinc Brightener 25, the new formulation is a free-flowing liquid that may be added directly to plating baths without prior dilution.

It is extremely useful for applying a uniformly bright zinc plate to low-current-density areas such as recesses and threads. It is suitable for use in barrel, as well as hand, hoist or automatic plating operations.

Other claimed advantages for the new liquid brightener include: brilliant and crystal clear zinc deposits that exhibit uniform high luster, exceptional receptivity of the zinc deposits for bright dips and chromate dips; full, bright deposits on case-hardened or hot-rolled steels; packaged in easy-to-handle and easy-to-store, 5-gal cubitainers.

E—215. BURNISHING COMPOUNDS—Three new barrel finishing compounds have recently been announced by Almco, Queen Products Division, King-Seeley Corporation.

Compound No. 101 is a concentrated powder specifically formulated to burnish aluminum, zinc, stainless steel and other metals to a highly uniform, lustrous finish. It is claimed to be a universal burnishing compound for die-cast parts, in many cases giving results that equal or surpass hand-buffed finishes.

Compound No. 101A is a cleaning and burnishing liquid for metal cleaning, burnishing, and light degreasing operations, recommended for use in spindle machines, submerged barrels, and the new vibratory, finishing machines.

Compound No. 403 is a neutral abrasive compound which can be used with any type of media for cut-down of both ferrous and non-ferrous metals. An economical, closely-screened, aluminum-oxide base compound, it contains grease and oil emulsifiers, water softeners, rust inhibitors, and abrasive materials. It can be used in self tumbling as well as with all types of barrel finishing media to generate radii, improve micro-inch finishes and deburr.

JUST OFF THE PRESS

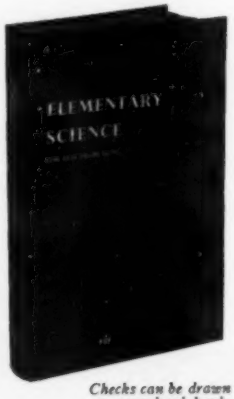
Mechanical Polishing by W. Burkart, H. Silman and C. R. Draper. December 1960. 267 + xxxiv pp. 205 illustrations. Price $9.25 postpaid.

Manual and automatic polishing and buffing, barrel finishing and abrasive blasting of ferrous and non-ferrous metals and of other industrial products including plastics, glass and lacquers.

This detailed account of current practice in England, America and Germany covers plant, materials and theory. Particular attention is paid to more recent developments such as automatic polishing machines, liquid polishing compositions, wet blasting processes, barrelling and the polishing of light metals, diecastings and plastic mouldings. A comparison is made between mechanical polishing and electro- and chemical polishing.

Elementary Science for Electroplating Students and Foremen by E. A. Ollard, A.R.C.S., F.R.I.C., F.I.M. February 1961. Approx. 110 pp. 22 illus. Price $2.80 postpaid.

An easy-to-read text by a man of international renown, enabling those with no knowledge of science to obtain some idea of what is meant by molecular weight, ions, Faraday's Laws, pH, ohms, polarization, cathode efficiency, Brinnel hardness, ductility, etc., to understand simple chemical equations and the effects of varying current, temperature, agitation, etc.; and to make calculations of heat and current requirements, surface areas and so on. Written especially for electroplating students, foremen and operatives to help them profit from reading technical articles and books and from attending Society meetings.



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E—216. FILTER TUBES—An economy line of viscose filter tubes has been introduced by Sethco Manufacturing Corp. for use with their filter systems for depth filtration. Supplementing, but not replacing, their line of cotton, dynel, porous stone and porous carbon, the viscose filter tubes are priced to reflect savings over the cost of cotton tubes. They are suitable for mildly acid and alkaline solutions in the *p*H range of 3 to 11, and are available with either perforated steel, stainless steel or perforated polypropylene cores in Sethco no. 5 and no. 10 sizes.

E—217. PHOTO RESIST STRIPPER—A non-flammable liquid which rapidly removes Kodak Photo Resist (KPR) and other acid resists from printed circuit boards after etching has been developed by Enthone, Inc., subsidiary of American Smelting and Refining Company. Called Stripper "K", the new product is said to remove most photo resists in less than one minute. Pressure spray rinsing is usually all that is required to remove residual resist after immersion in Stripper "K" thus eliminating laborious scrubbing of the boards.

Stripper "K" is used full strength at room temperature. After etching away of exposed copper, printed circuit boards are simply immersed in the stripper until the photo resist is wrinkled or softened sufficiently so that it can be flushed away in a subsequent cold water rinse. There is no attack of most printed circuit boards. Stripper "K" may be contained in plain steel tanks or drums. It does not contain phenol or phenolic compounds.

E—218. VIBRATORY MACHINE—A compact, self-contained vibratory finishing machine with work container capacity of 1½ cubic feet has been introduced by Pangborn Corporation. Designed as a production unit for finishing small parts, the 1½ YA is suitable for a variety of applications on metal, plastic and ceramic items.

The rubber-lined work container holds up to 500 lb of media and work pieces and is supported by a system of air cushions. Amplitude as well as frequency is variable.

The machine may be operated in buildings where structural limitations prohibit the use of conventional spring-mounted machines. When placed on air-cushioned floor mounts no vibration is transmitted to the floor.

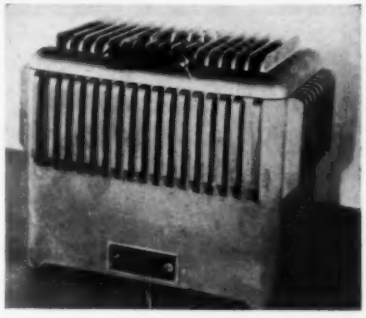
E—219. NICKEL PLATING PROCESS—The Udylite Corporation has a nickel plating process that is claimed to produce a satin-type finish directly from the plating bath. The new process, designated "Satylite" is said to produce a rich, smooth, non-reflecting nickel plate without hand polishing or buffing.

Announcing the marketing program for Satylite, Clyde H. Reeme, Udylite president, said the new process will augment rather than replace the existing plating processes now used by industry.

An advantage of the Satylite process is the ease with which a two-tone effect may be obtained. Buffing raised, accessible surfaces to a high luster creates an attractive contrast between the bright buffed surface and the surrounding satin finish that has been obtained directly from the plating bath.

The appearance of the Satylite finish is preserved and enhanced by the addition of a final chromium plate. Flash coatings of other decorative metals, such as copper, brass and bronze, may be substituted to produce attractive satin or contrasting finishes of these metals at lowered costs.

E—220. PAINT STRIPPER—Chemclean No. 441B has been developed to strip "zinc clad" steels of paint without attacking the zinc and is claimed to provide economy of operation, long tank life, and simple control. A mixture of strongly alkaline salts, used at 8 to 16 oz/gal of water at 180 to 200F in a mild steel tank, 441B is said to strip quickly and completely, leaving a surface ready for immediate re-painting without further treatment.



E—221. VAPOR DEGREASER—An air-cooled vapor degreaser has been developed by Beta Engineering Co. It is electrically heated by 115v ac power and requires no water or drain piping. It is constructed of cast aluminum and weighing only 25 lb is easily portable.

Using trichlorethylene solvent the simple process of vaporizing and condensing in the cooling zone assures constant degreasing with freshly distilled solvent. Dirty parts are said to be cleaned and dried in minutes ready for buffing, plating, painting or assembly operations.

PLATING MAGAZINE

OPPORTUNITY TO AUTHORS

Member or non-member authors of technical and scientific papers on electroplating, metal finishing and allied arts are cordially invited to submit manuscripts of original, unpublished papers to the Editor of PLATING MAGAZINE for review and publishing consideration.

Any such paper accepted and published in PLATING will also be eligible for selection by the Society's Paper Awards Committee for the Carl E. Heussner AES Gold Medal Award; AES Silver Medal; AES Bronze Medal; George B. Hogaboom Memorial Nickel Plating Award; Robert S. Leather Mechanical Finishing Award; Chromium Plating Award; Precious Metal Plating Award of AES; John J. Hanney Memorial Copper Plating Award; Organic Finishing Award of AES and the Zinc Plating Award.

So as to expedite review and other processing, please write the Editor, PLATING MAGAZINE, 443-445 Broad Street, Newark 2, New Jersey, for full particulars, including a copy of "Publishing Specifications for PLATING MAGAZINE Authors", before submitting your manuscript.

PERSONALS

PEDER FIELD has been appointed to the position of conveyor sales engineer of Hanson-Van Winkle-Munning Company. He will be responsible for sales-engineering of H-VW-M automatic and related metal-finishing processing equipment. He will be based at the company's headquarters at Matawan.

Mr. Field has been associated with the plating industry since 1950, beginning as plating superintendent for an independent plating company, and later as a plating equipment specialist for a well-known plating equipment supplier.

He is a member of the American Electroplaters' Society (Detroit Branch) and has attended the College of Engineering of the University of Michigan, specializing in mechanical engineering.

P. Field

H. Narcus

HAROLD NARCUS, president and technical director of Electrochemical Industries, Inc. of Worcester, Mass., has been retained by Enthone, Inc. of New Haven, Conn., as a consultant in all phases of plating on non-conductors. Dr. Narcus will assist both Enthone and its customers with problems involving electroless plating, plating on plastics and ceramics, and the cleaning and plating of printed circuits.

Dr. Narcus received his Master of Science degree from Worcester Polytechnic Institute and PhD degree in organic chemistry from Clark University. He has specialized in plating on plastics for over 25 years. Several patents relating to the metallizing of non-conductors have been issued to Dr. Narcus in the United States, Canada and Great Britain.

He is the author of the recently published "Metallizing of Plastics" and of numerous papers. In 1945, he originated the plated-through hole process in printed circuitry.

Dr. Narcus is a member of Sigma Xi. He is a past president of the Boston Branch of the AES. His other memberships include the American Chemical Society, Electrochemical Society and the American Society for Testing Materials. He is a registered professional engineer in the state of Massachusetts.

♦

DR. DONALD M. BLACK has been appointed to the position of manager of development and market research of Diamond Alkali Company.

Employed previously by the Monsanto Chemical Company for 13 years where he was responsible for organic, inorganic and polymer market research and market development projects, Dr. Black is also a widely known contributor to national technical publications. Periodically he participates in seminars at the Massachusetts Institute of Technology.

A graduate of Rensselaer Polytechnic Institute, Black received his PhD from MIT in 1947.

♦

MARVIN R. MOYER has been named as technical sales representative of Frederick Gumm Chemical Company, for its complete line of plating, aluminum finishing, and barrel finishing compounds and equipment in eastern Pennsylvania (excluding Philadelphia), Delaware and Maryland.

Mr. Moyer is a member of the American Electroplaters' Society, with a wide background in production and servicing in the metal finishing industry. His office will be maintained in Berwick, Pa.

♦

M. R. Moyer

W. W. Guptill

WESLEY W. GUPTILL has been named general sales manager of Tect, Inc., Northvale, N. J.

Mr. Guptill has a degree in business administration from Dickinson College, was sales manager in the Systems Division of Remington Rand, and general sales manager with Pathe Inc. and Thermway Industries, Inc.

WILLIAM ROTHSTEIN has been named regional sales engineer for Technic, Inc. Mr. Rothstein will be in charge of sales and service to platers throughout the Central United States.

Formerly chief plater for Unity Manufacturing Co., Chicago, Mr. Rothstein has been associated with electroplating firms in the Chicago area since 1950. He is a member of the American Electroplaters' Society.

♦

DR. DODD S. CARR has rejoined Bart Laboratories and Design, Inc., as vice president of research, it was announced recently by **S. G. BART,** president of the Newark, N. J. firm. In addition to his duties in research on new and improved electroplating processes, Dr. Carr will serve as quality control director for the parent company, Bart Manufacturing Corporation. Until recently, Dr. Carr was technical assistant to the vice president of the Freeport Nickel Company, and from 1952 to 1959, he was director of research for the Bart Manufacturing Corporation. For three years prior to that, he was engaged in electroplating research for the International Nickel Co., Inc.

Dr. Carr is a member of the American Chemical Society, American Electroplaters' Society, the Electrochemical Society, American Society for Testing Materials, and the Society of the Sigma XI, an honorary research society. He is also listed in the "American Men of Science," and "Chemical Who's Who."

♦

AL KORBELAK has been appointed a vice president, Sel-Rex Corporation, and **SID MITWOL** a vice president of The Meaker Company, a subsidiary. The announcement was made by **MORRIS M. MESSING,** president of both companies.

According to the announcement, Mr. Korbelak's area of responsibility will continue to be the development of applications and new markets exploration for Sel-Rex's diversified line of precious metal electroplating processes as well as liaison with the technical staff in the development of new products for which field work may have uncovered need. Additionally, he will supervise all Sel-Rex customer services.

A graduate of Tufts College, Mr. Korbelak's background includes several years as an electrochemist with Seymour Manufacturing Company where he contributed to the development of their bright

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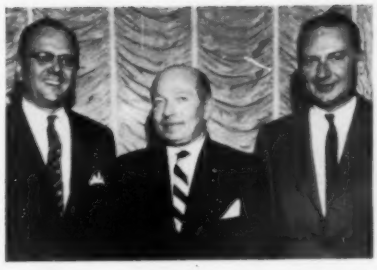

Messrs. Al Korbelak, left, and Sid Mitwol, right, with Morris M. Messing, president of Sel-Rex and Meaker Company, immediately following the announcement of their appointment as vice presidents.

nickel processes. He also spent 11 years with Westinghouse Electric Corporation in their electronic, chemical and metallurgical engineering departments.

Immediately prior to joining Sel-Rex in 1954, Mr. Korbelak was editor of PLATING MAGAZINE. The author of several papers on the techniques of electroplating difficult metals, he holds patents on pulsating techniques and metal processing.

Mr. Mitwol, who has been general manager, Rectifier Division, for the past year, will continue in this function as vice president and general manager, Electrical Division, The Meaker Company. The position reportedly includes line responsibility for all activities of the division . . . sales, manufacturing and new product development.

Having joined Sel-Rex in 1948 as sales engineer, Mr. Mitwol has progressed through positions of increasing executive responsibility, and was manager of the firm's Detroit office prior to his current assignment.

A graduate electrical engineer of C. C. N. Y.'s School of Technology, Mr. Mitwol was formerly associated with Federal Telephone and Radio Company and Radio Receptor Company, Inc.

Messrs. Korbelak and Mitwol will continue to make their headquarters at Sel-Rex-Meaker executive offices at 75 River Road, Nutley, New Jersey.

♦

FRANCIS H. ANDERSON has been named superintendent of the El Segundo, California, Works of Allied Chemical's General Chemical Division.

With the division 19 years, Mr. Anderson was superintendent of its plant in Elizabeth, N. J. for the past three. Earlier he served as superintendent of General's former Edgewater, N. J. plant and as maintenance supervisor of General Chemical Defense Corporation at Point Pleasant, West Virginia, which the company operated for the government during World War II.

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3 — Lasalco 36 x 12 cylinder
4 — H-VW-M 24 x 12
7 — Udylite 36 x 14
1 — H-VW-M — 4 compartment, 30 x 14 Lucite Unit

FILTERS

10 — Industrial, Alsop, Sethco — all sizes, all makes — nickel and cyanide solutions

TUMBLING BARRELS

2 — Henderson barrels 5A tilting type
2 — Globe barrels
2 — Roto-Finish — DW-36-2 Rubber
1 — Roto-Finish DW-22-36-1

POLISHING MACHINES

2 — Production Machine #101 — 10 H.P.
2 — Acme A2
3 — Acme B10
2 — Divine Model VM-10
10 — L'Hommendieu 5 H.P. variable speed
15 — Holland 5 H.P. — 10 H.P.
4 — Gardener 5 H.P. — 7½ H.P.
6 — Divine Idlers
2 — Hammond — RRO-Double 5 H.P.

RHEOSTATS — all sizes

2 — Crown — 12 x 12

MISCELLANEOUS

14 — Detrex and Blakeslee Degreasers
25 — Blowers and motors — multivane (fume) paddle wheel

TANKS

200 — All Sizes — all linings

RECTIFIERS

2 — Green Selenium 5000 A, 6 V, 440/3/60
2 — Green Selenium 3000 A, 6 V, 440/3/60
4 — 1500 amp., 6 volt DC for 220/3/60 AC Remote Control
1 — G.E. 2000/1000 amps. 6/12 V. Remote Control 440/3/60 AC

PLATING GENERATORS

1 — 5000/2500 ampere, 6/12 Volt 40° Chandeysson, Synch. 4
2 — 7500/3750 ampere, 6/12 Volt Chandeysson, Synch. 40°
2 — 6000/3000 ampere, 6/12 Volt, Electric Products and Chandeysson, Synch.
1 — 6000/3000 ampere, 9/18 Volt, 40°C Chandeysson, Synch. Exciter-in-head.
2 — 5000/2500 ampere, 6/12 Volt, 25°C Chandeysson, Synch.
1 — 4000/2000 ampere, 6/12 Volt, H-VW-M, Synch, Exc.-in-head.
1 — 3000/1500 ampere, 12/24 Volt, Chandeysson, Exciter-in-head.
2 — 2000/1000 ampere, 24 Volt, H-VW-M

SPECIAL

10 — Duskop Dust Collector Cabinets, Sizes No. 550, No. 850, No. 1100
4 — New Model B Niehaus S.S. Fume Separator
2 — Crown 48 x 36 Compartment horizontal tumbling barrel, lined or unlined
7 — Mercil Nickel Plating Barrels 12' x 36" with R.L. Tanks
1 — Acme LBL Semi-Automatic Buffing Machine, 8 Spindles with 2, 7½ H.P. Heads

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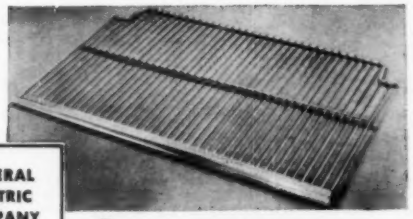
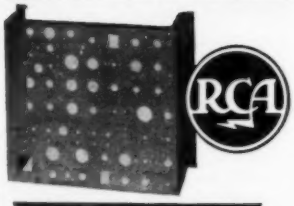
Iridite, in combination with other Allied Research processes, can provide a wide variety of finishes. As an example, Iridite 8-P applied to zinc or cadmium, followed by an application of Irilac, gives a highly attractive simulated brass finish.



GENERAL ELECTRIC COMPANY



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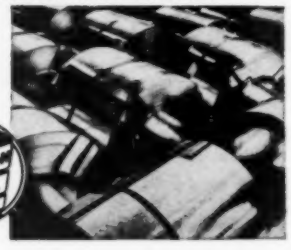

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IRIDITE—a specialized line of chromate conversion coatings for nonferrous metals. Easily applied at room temperatures with short immersion times, manually or with automatic equipment. Forms a thin film which becomes an integral part of the metal. Cannot chip, flake or peel. Special equipment, exhaust systems or highly trained personnel not required.

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ALLAN J. ROSENBERG has joined Simmons Plating Works, Atlanta, Ga. His position is that of assistant manager, and he will be in charge of quality control at the Simmons plant. He is a graduate of the Massachusetts Institute of Technology where he received his BS degree in metallurgy. Mr. Rosenberg was connected for two years with Union Carbide, Oak Ridge, Tenn.

♦

KEN C. TUCKER, formerly manager of the food industries division of Oakite Products, Inc., has been named assistant sales manager of the firm.

Mr. Tucker was educated at New York University and has been with Oakite since 1945. He has served on many industrial committees and has presented papers before many association meetings. One of his major responsibilities in his new post will be the servicing of national accounts.

K. C. Tucker

W. C. Archinal

WALTER C. ARCHINAL has received appointment as superintendent of coatings production at Metal & Thermit Corporation's Carrollton plant.

Mr. Archinal has been associated with the company's Coatings Division since 1959 as a research chemist. He was graduated from Adelphi College with the degree of BS in chemistry.

Prior to joining M&T, Mr. Archinal was employed as a chemist by the Rubber Corporation of America.

♦

DR. RALPH A. SCHAEFER of Toledo, Ohio has been appointed director of research of The Electric Storage Battery Company.

Dr. Schaefer is 47. Since 1958 he has been director of engineering and research of Bunting Brass & Bronze Company, Toledo. In his new post he will make his headquarters at the Carl F. Norberg Research Center, Yardley, Pa., where he will direct the expanding research activities of the company.

A native of Grafton, Ohio, Dr. Schaefer graduated in 1935 as a chemistry major from Western Reserve University, Cleveland, and was elected to Sigma Xi. A year later he received a Master's degree in physical chemistry, and in 1941 Western Reserve awarded him the degree of Doctor of Philosophy in physical chemistry.

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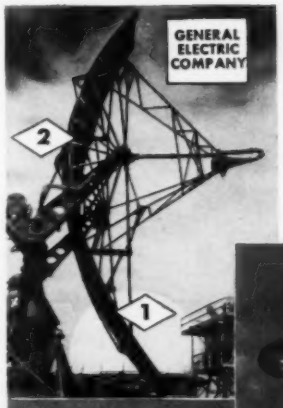

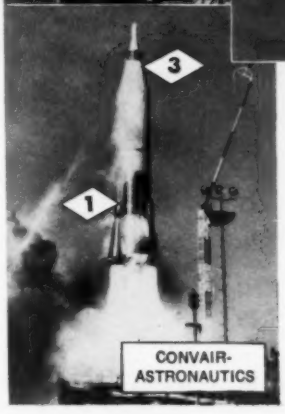

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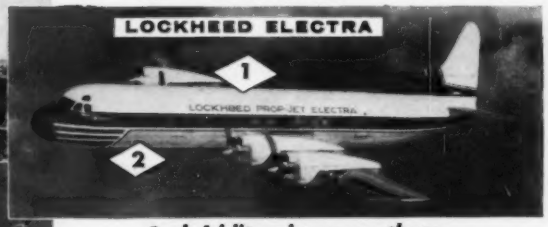

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In 1936 he joined Cleveland Graphite Bronze Company, Cleveland, a division of the Clevite Corporation, as a research chemist, and in the next 22 years he worked successively as supervisor of chemical development, director of research and technical advisor to the president. For two years he was vice president of the Clevite Brush Development Company, another Clevite Division.

In the American Electroplaters' Society, Dr. Schaefer served as national president in 1954-1955. He was president of the Electrochemical Society last year.

He also is a member of American Society for Testing Materials, American Institute of Mining and Metallurgical Engineers, American Chemical Society, Society of Automotive Engineers, Institute of Metal Finishing, and American Society of Metals.

•

GERALD J. NAVES JR., of Danbury, Conn., has been appointed eastern regional sales engineer for Technic, Inc. Formerly assistant manager of Danbury Metal Finishing Company, Mr. Naves has studied at Danbury State College, Bridgeport University, and New Haven College. He also has developed an accelerated technical course for electroplating apprentices. He is a member of the American Electroplaters' Society and the U. S. Junior Chamber of Commerce and is a veteran of navy service.

JOHN BASTUBA

The Detroit Branch has regretfully announced the passing of one of its members, John Bastuba, 727 Beechmont Street, Dearborn, Michigan.

Mr. Bastuba was a native Detroiter and at the time of his death was an experimental polisher and plater on the research staff at General Motors Technical Center. He was engaged in the development and evaluation of polishing techniques and materials.

Before joining the research staff at the Technical Center, he had been employed by the Ternstedt Division in a similar capacity since 1926. He set up and operated the first automatic buffing machine put in operation at Ternstedt.

•

DR. RICHARD SPRINGER

The many friends and acquaintances of Dr. Richard Springer, well-known consultant in the metal finishing field are saddened by his death on November 25 after a lingering illness of a year. Dr. Springer, who lived in Frankfurt am Main, had many friends in the U. S. A. During his last visit to the States he attended the International Conference on Electrodeposition at Detroit in 1959.

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Neither AES's membership directory nor PLATING MAGAZINE mailing list are released to anyone for any purpose. As an accommodation to PLATING MAGAZINE advertisers wishing to link their PLATING product advertising with direct mail promotion, however, PLATING maintains a direct mail service featuring the largest audited paid circulation in the electroplating, metal finishing and allied arts field.

A bonafide example of the advertiser's proposed mailing must first be received and screened by PLATING. If mailing assignment is accepted thereby, the entire quantity must be shipped by the advertiser to PLATING MAGAZINE's Newark, N. J. office, pre-stuffed, for PLATING addressing and mailing. No mailing of less than a thousand pieces is acceptable. For further, fuller details, including costs, write or call Thomas W. Lowe, Production Manager, PLATING MAGAZINE, American Building, 443-445 Broad Street, Newark 2, N. J. (Telephone HUmboldt 2-3400).

AES

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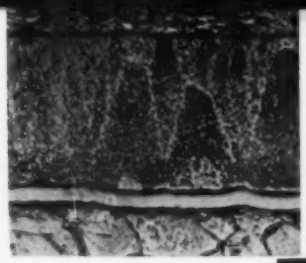
Lancaster: M. Darr, Q. S. Stump, H. D. Weeks

DEATHS

Springfield: A. S. Horta



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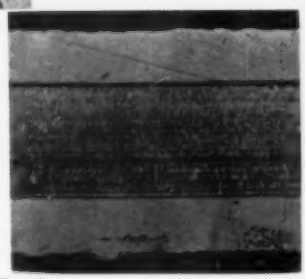

Proprietary Acid Gold 23.9 K

Fig. 5

ADDENDUM

TECHNICAL PROCEEDINGS (1960 EDITION) AMERICAN ELECTROPLATERS' SOCIETY, INC.

Though referred to in the Paragraph subheaded "Metallographic Study" (Page 72) in the technical paper by Barnet D. Ostrow and Fred I. Nobel titled "Recent Developments in Gold Electroplating" published on Pages 68–73 of the 1960 Edition of TECHNICAL PROCEEDINGS, Figure 5 was inadvertently not submitted by the Authors and consequently was not published. They have since then provided Figure 5, and it is presented above.

If you would like a copy of a printed sneet embodying this Addendum for insertion in your copy of TECHNICAL PROCEEDINGS, write Thomas W. Lowe, Production Manager, TECHNICAL PROCEEDINGS, American Electroplaters' Society, Inc., American Building, 443–445 Broad Street, Newark 2, N. J.

Now please refer to the transcript of the discussion that attended the delivery of said paper at Educational Session C, American Electroplaters' Society Convention, Los Angeles, California, July 26, 1960 (Page 235, Bottom Column One and Top Column Two, TECHNICAL PROCEEDINGS).

The Official Convention Reporter's verbatim transcript recorded the concluding discussion of Messrs. Nobel and Korbelak thus:

> MR. NOBEL: Thank you. I would like to comment that the metallographic section presented was not prepared in our laboratory but was prepared by a very competent and well-known consultant chemical engineer.
>
> MR. KORBELAK: I don't question his talent at all. It was just not knowing what they were looking for initially.

After receiving the stenographic transcript, Mr. Korbelak submitted to the Reporter an amended statement in place of the foregoing, and as thus changed, the concluding statement by Mr. Korbelak was published (Page 235, Top Middle Column) as follows:

> MR. KORBELAK: I recognize the photo and know the consultant. I do not question his talent at all. He has discussed the matter with our metallurgical staff and concurs with our conclusions relating to the true structure, i.e., that the structure is not columnar.

Mr. Nobel does not concur with the post-Convention amended statement by Mr. Korbelak, and has requested the opportunity to reply by the following submitted statement:

> MR. NOBEL: I have no doubt that different consulting engineers would likely have different opinions of a photomicrograph. Mr. Korbelak is in error though if he believes that the consultant he refers to is the one employed by us. I have spoken with our consultant and he has had no communication whatsoever with Mr. Korbelak or any of his colleagues.

The statements made by Messrs. Korbelak and Nobel are their own and, naturally, neither American Electroplaters' Society, Inc. nor its PLATING MAGAZINE assume any responsibility whatever for them. In fairness to both discussants and to TECHNICAL PROCEEDINGS' readers, both statements have now been presented.

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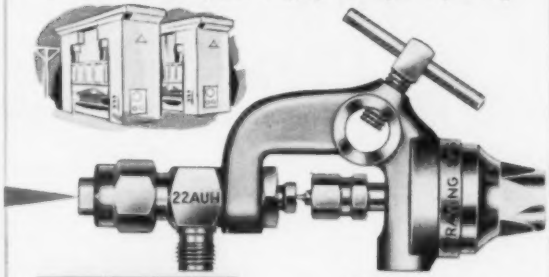

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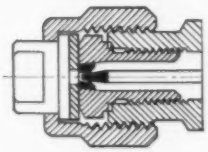

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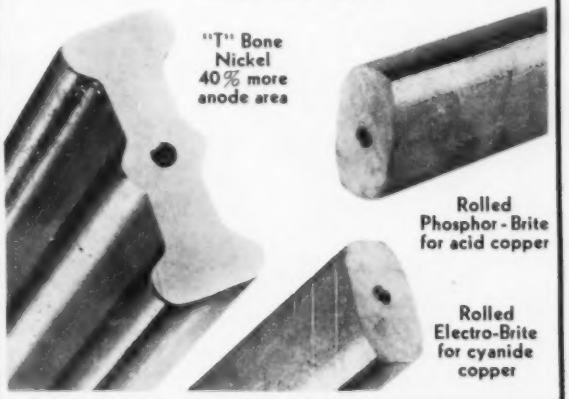

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BRANCH NEWS

Total AES Branches U. S., Canada, Australia, February 1, 1961—59.

BLUE RIDGE

Milo Speaks on Life Behind Iron Curtain, Dr. Murphy on Acid Inhibitors

The Blue Ridge Branch held its regular monthly meeting on December 6, 1960 at the Elks Club in Greensboro, North Carolina. Thirty members and guests attended the meeting.

At the business meeting the secretary, **Donald McGee,** announced that Poly Scientific Corporation of Blacksburg, Virginia had been elected a Sustaining Member of the Society. This is the first company to become a Sustaining Member for the Blue Ridge Branch. Five new members were elected.

After the business meeting those attending heard **Michael Milo,** Western Electric Company, speak on "Life and Freedom Behind the Iron Curtain." The regular speaker for the evening was **Dr. Nelson Murphy,** Virginia Polytechnic Institute, who spoke on the subject "How Acid Inhibitors Work, Part II." His talk was a continuation of the subject discussed at the November meeting.

Donald H. McGee
Secretary

BRITISH COLUMBIA

Annual Christmas Party

The Christmas Party was held on Friday, December 9 at the Lougheed Hotel. A delicious turkey dinner was served to the 65 members and guests.

Following the dinner, an enjoyable Old Yule Party and dance was held under the capable leadership of Mcee **Doug. Armstrong.**

We are truly grateful to all the companies and local branches of companies whose donations made this party possible.

C. Schlossareck
Secretary

BUFFALO

Christmas Party Highly Lauded

The Buffalo Branch held its annual Christmas Party at the Niagara Manor, Buffalo, N. Y., on Saturday, December 3, 1960, with 80 ladies and gentlemen in attendance.

Features of the evening were gifts for all the ladies, a cocktail hour from 7-8, topped off with a roast beef dinner with all the trimmings. An entertainment hour followed the dinner starring tap dancer Audrey Kay and commedienne Helen Hanes, under the direction of Ray Kneeland. Miss Kay gave quite a performance in tap dancing to a rhumba and was hilariously assisted by our president, **Harold Shapiro,** and **Bert Kirchoff.**

After the entertainment prizes were raffled that had been donated by twelve suppliers.

The Jay Knight Band furnished music for dancing during the remainder of the party. All members and guests had a very enjoyable time and were grateful to the chairman, **Charles Fotheringham** and his committee of **Mel Stachura** and **Daniel Stachowiak** for their work in presenting this fine annual Christmas "doings."

R. C. Eich
Secretary

CHICAGO

Branch Gets Lesson in Psychology

The Branch held its monthly meeting on Friday, December 9, at Petricca's Restaurant, 510 North Western Avenue. President **Matt Dassinger** brought the meeting to order at 8:00 p.m. and **Paul Glab** announced that three applications were received for membership. **Scott Modjeska** in a report on the banquet, said that the final arrangements have been made for an excellent floor show, a snappy dance band and the suppliers will have their "hospitality suite." Tickets are $12.00 each and the date is January 28, 1961, at the Conrad Hilton Hotel. **Russ Harr, Si Gary** and Paul Glab are preparing a new roster of the membership for the Chicago Branch. We are all happy to hear that **Hal Gilbertson,** a grand oldtimer, is recovering from a heart attack.

Dave Saporta, a member of the librarians committee, introduced the speaker of the evening **Dr. Ted Hurst** whose subject was "How Psychology Can Help You Get Ahead." Mr. Hurst is director of the firm Worthington, Hurst and Associates, industrial psychologists. People react or show their hostility or madness to bosses in various ways. The firm was called in to find the reasons why sales sharply fell off in three territories. It was found that in these areas, the call cards of the salesmen were not neat as formerly but had smudges, dog-ears, erasures and the pattern showed that the salesmen had a dislike for their sales manager. The cards from other salesmen, who were doing very well in their territory, were very neat and orderly. The salesmen were a "dead give away" in their hostile behavior by sending cards which were very carelessly prepared.

Mr. Hurst gave another example of antagonistic behavior toward the boss. The secretary resented the boss and another associate going over a report, which she had just typed, before mailing it to a concern. The result was she typed out another report which had misspelled words, erasures, etc. All behavior is a language—whatever a person does must have a purpose. Another classic example —a boss asks the worker what went wrong with the job—how come the job failed? The worker replies "Nuttin'." Passive resistance behavior is manifested in several ways (1) tardiness—a worker may send a report later than the due date—may get to a meeting late, etc. (2) procrastination muttering words which are not audible (3) silly mistakes which for the most part are very obvious and (4) lastly "sweet-talk" in various forms such as flattery, back-slapping, etc. It is very necessary to broaden our understanding of ourselves and our fellow workers so that we can use our abilities to get ahead. Numerous questions were asked and answered by Dr. Hurst.

Jack Winters will be our next speaker on January 13, 1961. His subject will be "The Anode Side of the Story."

Christopher Marzano
Publicity Chairman

CINCINNATI

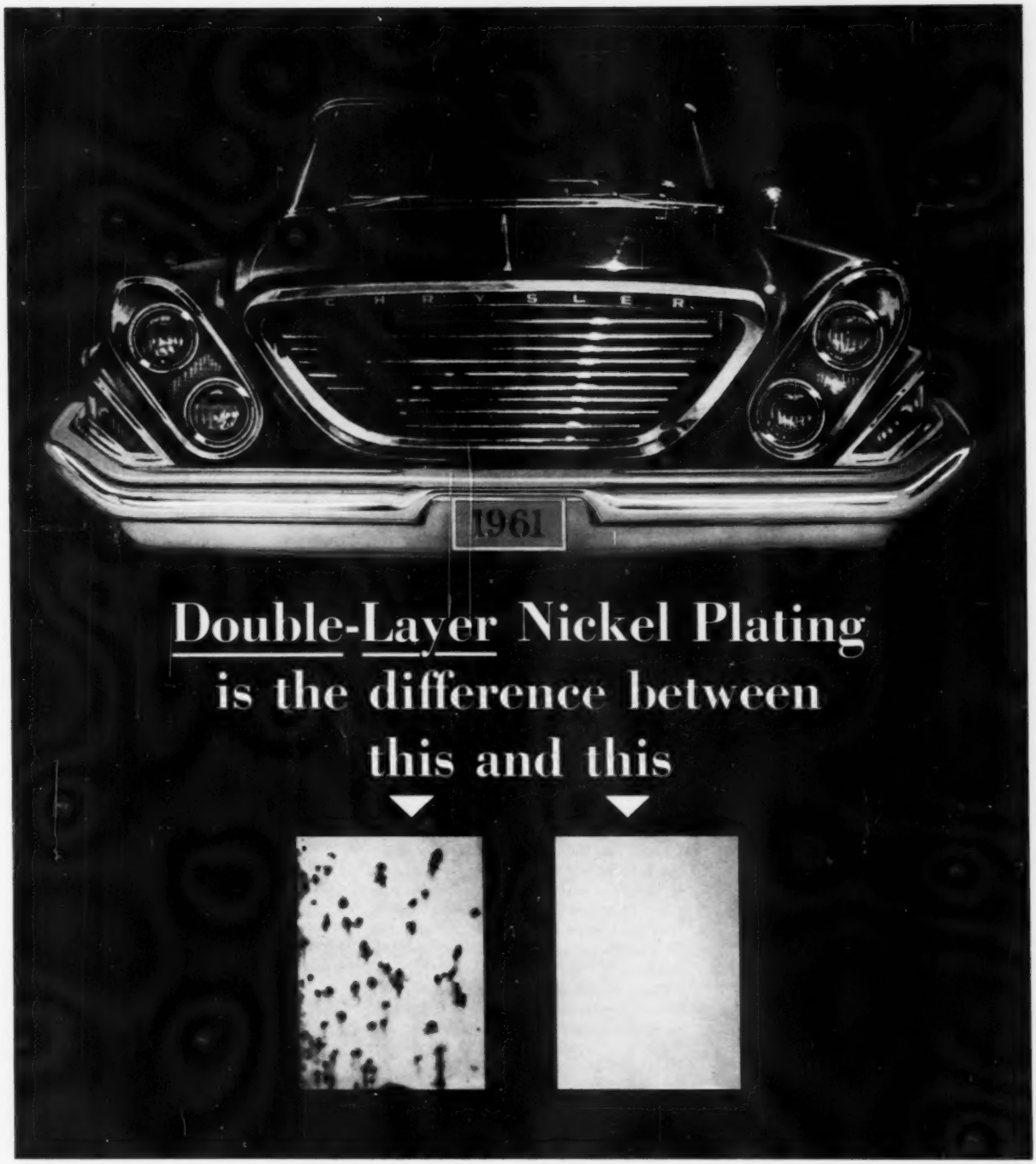
Modjeska Talks on Barrel Plating

The November 30 meeting was called to order by President **Leonhardt** with 30 members and guests present. One application for membership was approved. **Jerry Poll** reported on the Tri-State Regional Meeting which will be held in Columbus, Ohio on Saturday, February 4, 1961. **Bob Winston** reported that Ladies Night will be held on December 21, 1960, at the Engineering Society.

R. Scott Modjeska of the Scientific Control Laboratories Inc. was the speaker of the evening. Mr. Modjeska presented a paper on Solution Transfer in Barrel Plating in which he was co-author with **Simon Gary** and **Paul Glab.** Mr. Glab made the presentation of this paper at the Los Angeles Convention earlier last year. The speaker described the method in which the equipment was operated and the tests made to obtain the data for their presentation. The following conclusions were

BRANCH SECRETARIES

Branch News is required of all Secretaries monthly by AES Bylaws. First of the month is Branch News deadline for next PLATING issue. Any items on hand on that date will be carried in that edition. Later arrivals will appear in the issue immediately following. In reporting talks given by speakers before the Branch, please give titles of the talks, the speakers' full identification and any other pertinent information of interest to other Branches and PLATING's broad readership.



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After a question and answer period, the group adjourned to the social hour sponsored by the Harshaw Chemical Company, **Russ Waters** and **Lee Howald** as hosts.

David L. Kaplan
Secretary

CINCINNATI

Ladies Night Success Despite Snow and Cold

Eighty-four loyal members, wives and guests braved the remnants of a four and a half inch snow storm and zero degree temperatures on December 21 to attend the Annual Ladies Night at the Engineering Society. After dinner, President **Leonhardt** presented the Past President's Pin to **Bill Stephenson;** then the group was entertained by the speaker of the evening, **Lt. Arthur Mehring** of the Cincinnati Police Division. The lieutenant is better known in Cincinnati as the 'Copter Cop'; as he travels over the city during the rush hours to assist the citizens with their traffic problems. The officer entertained the gathering with some very interesting and unusual slides of the city taken from the helicopter. The slides not only depicted many of the landmarks of Cincinnati, but also showed what traffic jams look like from the air. After a brief question and answer period, the group adjourned to the social hour sponsored by the Northwest Chemical Co., **Dick Jager,** is the local representative. During the social hour, many fine prizes were won by those who were lucky enough to win one of the Bingo games sponsored by the Branch.

Bob Winston, the Branch librarian, should be commended for planning and executing a very entertaining program.

David L. Kaplan
Secretary

DALLAS-FORT WORTH

Shustik Discusses Cyanide Zinc Plating

The November 16 meeting was held at Howard Johnson's Turnpike Restaurant. Vice President **Frank Howard** officiated in the absence of President **William Aves,** who was in Cincinnati presenting one of his very interesting papers.

Vice President Howard introduced **Louis Shustik** of Du Pont, who spoke on Cyanide Zinc Plating and the problems that arise and the methods for correction. His talk was thoroughly augmented by slides.

Jack D. Haler
Recording Secretary

DENVER

Carter is Speaker; May Social Night Planned

The Denver Branch met December 8, 1960 at the Oxford Hotel. Following the dinner a short business meeting was held. It was decided that the arrangements committee should plan a social gathering for the month of May. The question again arose concerning meeting nights and the secretary was asked to mail questionnaires to all members.

Following the dinner **Bob Martin,** president, introduced the speaker **C. Willard Carter** of Metal and Thermit Corporation. His topic was the Use of Platisols and Organosols in Tank and Rack Coatings. Properties of the materials and their application were discussed. Of particular interest was the use of tough, durable finishes produced by organosols for use in the decorative field.

Elmer Schuster
Secretary

DETROIT

Electrochemical Society Shares Meeting

The January 6 meeting of the Detroit Branch was held as a joint session with the Electrochemical Society at 8 p.m. in the Michigan Room of the Statler Hilton Hotel.

John Capuano was technical chairman for the joint session, and the subject of the evening was "Why Use Plating Aluminum or Stainless Steel for Automotive Trim." Those who spoke on the selected topic were **Myron B. Diggin,** vice president and technical director of Hanson-Van Winkle-Munning Company; **Russell V. Vanden Berg,** manager of the Finishes Division at Aluminum Company of America; and **David Palmer Moore Sr.,** supervisor of quality control, Jones & Laughlin Steel Corporation.

W. G. Anderson
Public Relations Chairman

INDIANAPOLIS

Borlet Discusses Filtering; Branch to Host '62 Interim Meeting

John Holland, president, presided at the December 6 meeting when 45 members and guests met at the Construction League. **Robert Stewart** reported on the Tri-State meeting which will be at Columbus, Ohio on February 4. He told us about the committee meeting of December 3 and that one order of business was to be acted upon at this meeting. It is contemplated to have an extra session (workshop) for the Tri-State patterned after the Midwest Regional meeting at Notre Dame in October. Our group volunteered to do whatever necessary to put this kind of a session over.

Quentin Shockley, reporting on the January 1962 Interim Meeting which will be in Indianapolis, said all plans are running smoothly.

Steve O'Connor reported on membership and stated that we need 26 new members to bring our membership up the quota set for us by the National Office.

Robert Bruck gave a favorable financial report on the Tri-State. A new member from our Branch to Tri-State, **Paul Johnson,** was elected.

Two members of the Branch, **Tom Evans** of Columbus and **Roman Bender** of Indianapolis, are seriously ill and flowers are to be sent to them. The sending of flowers to members who are ill will be considered by the Board of Managers and a plan will be presented at the next meeting.

A motion was made by **Les Reynolds,** seconded by Quentin Shockley and carried to pay one delegate's way to the Interim Meeting on February 11 at Hartford, Conn.

National First Vice President, **Chester Borlet,** honored us with his presence at the December meeting and talked on "Filtering Plating Solutions." He commented that he met our Branch in 1958 at the Interim Meeting when he announced his candidacy for third vice president and will preside at the 1962 Interim Meeting when we have it for the second time in five years. His talk gave the fundamental reasons for filtering, the type of filters available, and said installation must be properly engineered. Many questions followed and much was learned about filtering.

Edna Rohrabaugh
Secretary

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LOUISVILLE

Saubestre Gives Paper on New Developments in Cleaners

The Louisville Branch held its regular monthly meeting on November 17 at Hasenour's Restaurant. A "chicken or steak" dinner preceded the meeting with 20 in attendance. First Vice President **Jim Smith** presided, but a motion was carried to dispense with the business portion of the meeting. **Stan Beyer** substituted for librarian **Norris Shake** to introduce the speaker, **Dr. Edward B. Saubestre,** member of the editorial board of PLATING MAGAZINE and technical director of Enthone, Inc.

In his talk on "New Developments in Cleaners," Dr. Saubestre described the stages of metal cleaner improvements as they pertain to (1) water base immersion cleaners for softening and removing buffing compounds, (2) spray-wash cleaners with surface active agents but without foaming, (3) electrolytic cleaners of many organic blends, (4) various cleaners with chelates and surfactants for rust removal and etching and inhibited for cleaning aluminum, magnesium and zinc die castings, (5) descalers of inhibited common acids and alkaline cleaner plus descaler. He pointed out that an ideal electrocleaner had four properties: (a) soil penetration, (b) surface wetting, (c) suspension of liberated oil, and (d) deflocculation. As a result of members' questions, Dr. Saubestre gave an animated description of the function of some less familiar cleaner ingredients such as chelates and surfactants.

Refreshments were served by the courtesy of suppliers.

Arthur A. Oertel
Recording Secretary

MIAMI

Burkard Talks on Metal Cleaning

As there was no business to come before the November 18 meeting at Miami Skyways Motel, Chairman **Earl Kennedy** turned the meeting over to **M. H. Dent,** librarian who introduced the speaker, **P. N. Burkard,** manager, industrial railroads and aircraft dept., J. B. Ford Div., Wyandotte Chemical Corp.

His subject was "Metal Cleaning with Emphasis on Electrocleaning and Aluminum Cleaning." He ran the gamut to ultrasonic cleaning, including descriptive slides.

Of special interest was the chemical milling of aluminum and his discussion of the masking problems in the chemical milling.

His mention of porcelain enameling aluminum caused him to be bombarded with questions, due to the fact that aluminum is so extensively used in this area.

The talk touched on processes of cleaning and finishing that are encountered daily in the local metal finishing plants.

Abe Schorr
Secretary

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MILWAUKEE

Milwaukee Branch Resumes Stride; Foulke, Pascoe and Steuernagel are Speakers

After a slow start, the Milwaukee Branch, at its December meeting, regained its pace-setting stride. Attendance was near the 50 per cent factor and net membership moved upward.

Simultaneous educational sessions were presented.

Dr. D. Gardner Foulke of the Sel-Rex Corporation and chairman of the AES Research Committee spoke to the Inorganic Section on the subject of "Jet Age Precious Metal Plating." For the most part, his talk was concerned with plating rhodium, platinum, and gold.

Dr. Foulke discussed the conventional rhodium phosphate and sulfate solution, both of which are slow and produce brittle deposits. He described a modified sulfate solution which may be used to plate low stress deposits in excess of 500 millionths of an inch.

According to Dr. Foulke, the little platinum that is done is for high temperature applications. He described a bath for producing heavy deposits with low stress.

He classified the several kinds of gold plating solutions in current use as cyanide, neutral, or acid, and discussed advantages and disadvantages of each type. He described the physical properties of the bright plates obtainable from the cyanide baths with organic or inorganic additives, as well as those obtained from the acid baths. He emphasized the importance of purification, efficiency determinations, and good control.

Walter R. Pascoe, technical service manager of the Whirlclad Division of the Polymer Corporation, addressed the Organic Section on the subject of "Fluidized Coatings."

Mr. Pascoe listed the advantages of the fluidized bed process as (1) permitting the use of insoluble resins, (2) requiring minimum cleaning, (3) making possible heavy coatings, (4) permitting the use of conveyorized equipment, (5) requiring low capital investment, (6) allowing the use of a large variety of colored materials having indefinite shelf life, (7) processing with short cycles and little material loss, (8) allowing rapid change from one material to another.

The speaker also discussed some of the problems involved in the use of the fluidized bed method. Uniform oven temperatures are required, and transfer from the oven to the bed must be done rapidly. Materials must be formulated properly, and it is difficult to apply films of less than 5 mil thickness.

Resins most commonly used in the process are: cellulosics, polyesters, polyethylene, vinyls, epoxies and nylon.

In summary, Mr. Pascoe stated that the fluidized bed method is applicable to steel, copper alloys and cast iron for product improvement not otherwise possible and that the cost in the average shop would probably range between 8 and 12 cents per square foot for labor, materials and burden.

A short business meeting was held prior to the educational sessions. An applicant was approved and was welcomed as a member of the Branch. The members approved previous action of the Board of Managers to designate Dec. 15, 1961 as Ladies Night and hold it as a banquet with entertainment and dancing in lieu of the regular December meeting, the annual meeting, and the Pabst and Racine meetings. This action was taken to avoid interference with the 1962 convention in Milwaukee.

Robert J. Steuernagel, in a brief talk, continued the discussion begun by **Henry Bornitzke** at the November meeting on the comparative roles to be played in the future by captive finishing plants and job shops. Mr. Bornitzke had conceded that job shops would fill certain needs, but that work requiring absolute quality assurance would continue to be done in captive shops. Mr. Steuernagel took the view that job shops, by reason of their specialized

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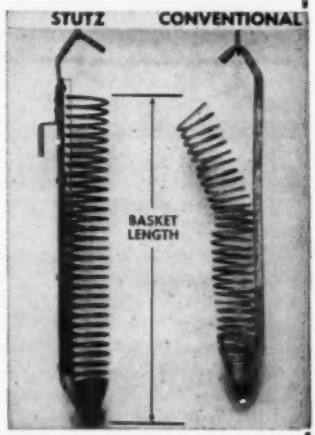

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L. Diveley
Secretary

MONTREAL

Dow Talks on Chromium Plating

The regular monthly meeting of the Montreal Branch was held on October 17, 1960 at the Sheraton Mount Royal Hotel. It was called to order by President **J. Rennie,** with 33 members and six guests present.

The guest speaker for the evening, **Ron Dow** of Metal & Thermit Co. gave a very interesting and informative talk on Trouble Shooting in Chromium Plating. Following his talk, Mr. Dow answered questions from the floor.

The Montreal Branch Annual Dinner Dance was held on September 24 at the Queen's Hotel, Salon Dore. Due to excellent planning by **Jack Reisenburg** and his committee, the event was once again a great success. This dinner dance is becoming more and more popular each year.

The 1960-1961 Branch delegates and alternates were selected at the meeting. As delegates, **M. Cohen** and **R. Niggemann** and as alternates, **J. Reisenburg, J. Kane** and **H. Wilson.**

Three new members were accepted into the Branch at this meeting and six other applications were received.

President J. Rennie notified the members that the third year Electroplating Course would be held this year once again at Ecole Polytechnique. No first year course would be available before next year.

George Katronge
Secretary

MONTREAL

Levick Speaks on Coated Abrasives

The regular monthly meeting of the Montreal Branch was held on November 21st, 1960 at the Sheraton Mount Royal Hotel. The meeting was called to order by President **J. Rennie** with 27 members and 3 guests present.

The guest speaker for the evening **R. E. Levick** of Behr Manning (Canada) Ltd., gave a very interesting talk on "Metal Finishing Through the Use of Coated Abrasives. Mr. Levick supported his talk with a short film on "Better Off-Hand Polishing With Coated Abrasives."

One new member was accepted into the Branch and two more applications were received at this meeting.

George Katronge
Secretary

NEWARK

Craft and Bikales Present Papers at Annual Session

President **John Banta** called the 47th Annual Educational Meeting to order on December 16 at 8:30 p.m. with 35 members and guests in attendance. The Branch was most fortunate in having several distinguished visitors, the AES National Third Vice President and a Past President of the National Society, **Frank Beuckman** and **George Swift,** respectively; Boston Branch President, **Hubert H. Foley;** and **Jim Lindsay** of the Detroit Branch.

John Banta complimented those who attended this evening, since road conditions made traveling extremely difficult.

Messrs. Swift and Foley spoke a few words about Boston's forthcoming Convention in 1961, and urged us to attend.

One application for membership was received and one new member was elected.

Al Korbelak reported that the Christmas Party arrangements were complete. **Mel Teets** stated that ten suppliers have joined together to arrange the cocktail party prior to our annual affair. **Cy LaManna** reported that announcement for the forthcoming Electroplating Course was out and that 28 applicants were registered thus far.

Educational Chairman LaManna introduced **Arnold Craft** as the Timely Topic Speaker. His subject was the "Analysis of Precious Metal Plating Solutions by Polarographic Methods." He described in detail a procedure for the analysis of gold, cobalt, nickel and indium in a gold-plating bath. He indicated the advan-

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Newark Branch Technical Chairman F. J. LaManna flanked by speakers Arnold Craft, Sel-Rex Corporation, left, and Richard Bikales, Metal & Thermit Corporation.

tages and disadvantages of polarographic methods of analysis and pointed out other possible applications for this method of analysis. Polarographic analysis is well suited for rapid routine analysis resulting in lower costs and a savings in time.

Richard Bikales of Metal & Thermit Company spoke on "Chromium Plating." He reviewed chrome plating in general, defining its merits and what constituted good chromium plating. He stressed training the plater on "workmanship" in order to obtain results. Furthermore, he felt that when trouble was encountered, the plater could obtain excellent help from consultants and technical representatives of suppliers; and, by working together they could solve their common problems resulting in further achievements and cost savings.

He described in detail, the newest developments, in chromium plating, namely, bright crack-free chromium plating, duplex chromium plating, and lastly a new type chromium plating barrel. He claims that the barrel is capable of turning out 200 pounds of work per hour having a flash chromium plate.

Good chromium plating is dependent to a large extent on good nickel plating. Mr. Bikales discussed many pitfalls of nickel plating, and showed how they affected chromium plating. He pointed out such details as the bipolar effect, the passivity of nickel plating and its activation and how the use of excess brightener in the nickel bath can cause flaking of chromium.

The meeting adjourned at 10:30 p.m. in anticipation of enjoying the Christmas Party on the following evening.

About 350 members, their wives and guests enjoyed the Christmas Party. It was a festive occasion, starting with a cocktail hour, followed by the banquet and three acts of entertainment, and concluding with dancing to the music of Al Lange and His Orchestra.

Gustav Bittrich
Assistant Secretary

PHILADELPHIA
Logozzo Shows Films and Speaks on Chromium Plating

A regular meeting of the Branch was held at Beck's on the Boulevard Restaurant, Monday, November 28 with 46 at dinner and about 100 at the meeting, called to order at 8:25 by Branch President **Cogan.**

The speaker was **Arthur W. Logozzo,** Nutmeg Chrome Corp., whose topic was "Several Phases of Chromium Plating." Mr. Logozzo spoke briefly on the early chromium plating bath formulas and present day proprietary solutions containing silico-fluorides to provide a self-regulating catalyst. He stated that crack-free chromium on copper and brass is suitable for indoor corrosion protection. In commenting about the use of ultrasonics in chromium plating, Mr. Logozzo stated a major disadvantage was that everything was shaken off the anodes. However, ultrasonics offered advantages in cleaning and pickling—hydrogen embrittlement is minimized; oxide is removed in a nickel bath; stripping is speeded with uniform results; aluminum castings are cleaned better for plating; a better deposit of zinc is produced when used in the zincate solution when preparing aluminum for plating.

Following, Mr. Logozzo showed two color films made by himself covering in excellent detail the many steps involved to prepare surfaces for hard chromium plating, the racking and masking of parts, the actual plating and the steps taken after plating to produce the completed job. So thorough is the ground covered that every class given electroplating instructions should be shown these films.

Following Mr. Logozzo's presentation, guests were introduced, three membership applications were received and the minutes of the previous regular and Executive Group meetings were read and approved.

A discussion was held on another Branch meeting place and a motion was passed authorizing the Executive Group to change the Branch meeting place at the expiration of the present contract with the

Engineer's Club to Beck's on the Boulevard Restaurant.

The secretary read several communications and the meeting adjourned at 10:30 p.m.

I. Wm. Marcovitch
Secretary

PITTSBURGH
Winters Discusses Cadmium and Zinc Plating

The December meeting of the Pittsburgh Branch of the American Electroplaters' Society was held at Gateway Plaza on Wednesday December 14, 1960. Three new members were elected.

President **Fred Stevens** announced the appointment of **R. P. Cope** and **W. D. Corr** as co-chairmen of the Annual Ladies Night program.

J. B. Winters of Incar, Inc. presented a very interesting and informative technical discourse on "Bright Cadmium and Zinc Plating."

Clyde A. Mungall
Secretary

PORTLAND
Cook to Consult on Buenos Aires Plating Education

The Portland Branch met December 16, at the Ho-Ti Supper Club. Members' wives contributed to the Christmas gaiety and new officers were elected.

President-elect for the coming year is **Everett Cook.** Everett will be assisted by **Bob Finzer,** first vice-president; **Herbert Suggs,** second vice president; **Ken Smith,** librarian; and **Ed Elkins,** secretary.

The Portland Branch again is sponsoring a plating school at Portland State College commencing January 9.

Everett Cook has been contacted by the platers of Buenos Aires, Argentina and will serve as consultant to them on a plating education program.

The Portland Branch wishes a successful 1961 to our executive officers and fellow members.

Ed Elkins
Secretary

ROCHESTER
Conversion Coatings Discussed by Mitchell; Regional Plans Reported

The November meeting was called to order by First Vice President **Charles Fideor.**

Due to a record attendance, Mr. Fideor requested all to introduce themselves. There were two guests present, **"Nels" Henthorne** and **Don Lewis. E. A. Pottridge** gave a final report on our annual dinner-dance at Midvale Country Club on December 3. A large turn-out is expected.

"Vern" Schaeffer stated that plans for the Empire State Regional Meeting to be held here on May 5 and 6 are well on their way, all the various committees are working like beavers to make this one the best yet

It was announced that a new secretary will be elected at the December meeting.

The meeting was then turned over to our librarian, **Loring Carson,** who introduced **Harold Mitchell,** vice president of the Chemical Corp. Mr. Mitchell's talk on Conversion Coatings was most complete and informative. A colorful film followed and when the question period ended many problems had been solved for those present.

At the close of the meeting, refreshments were served by the Branch.

E. A. Pottridge
Acting Secretary

ROCHESTER
Pettit is Speaker; Thornton Branch Honorary Member

At the December 5 meeting of the Rochester Branch, **Ralph E. Pettit** of the Diversey Corporation, Chicago, Ill., gave a most informative talk on metal etching. His talk titled "Manufacture of Etched Metal Goods" was supplemented by color slides and a display of manufacturing steps and finished products. Mr. **Beebe** of the Diversey Corp. assisted Mr. Pettit with the displays.

After a question and answer period a lunch was served by Messrs. Pettit and Mr. Beebe through the courtesy of Diversey Corporation.

During the business meeting, **Peter VanDilst** was elected secretary of the Rochester Branch. A letter of acceptance, as Honorary Member, from **Cecil Thornton** was read.

Peter VanDilst
Secretary

ROCKFORD
Bright Nickel Plating Discussed by Morris

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heard **Don Morris** discuss "Recent Developments in Bright Nickel Plating."

Mr. Morris, senior field electrochemist for Hanson-Van Winkle-Munning Co., being no stranger to our Branch, spoke very informally on modern nickel plating practises and outlined the following advantages achieved by the new nickel baths currently enjoying industry acceptance: (1) better corrosion resistance (2) better leveling (3) improved mechanical properties, (4) high brightening (5) improved HCD plating (6) better distribution of plate (7) improved surface activity, (8) economy in keeping with quality and ease of operation.

After discussing in detail the above aspects of the subject, he added a short talk on "The Use of Nickel for Functional or Engineering Purposes in Place of Hard Chromium Plating," primarily as used in electroforming and record stamping.

Branch President **Harold Ellis** announced the progress of the Annual Meeting plans and appointed **Al Overby,** chairman of ticket sales and programs for our annual to be held at the Faust Hotel on March 11.

ST. LOUIS

Robins Discusses Aluminum Bright Dipping

The regular monthly dinner meeting of St. Louis Branch was held Wednesday night, December 14 at the York Hotel. There were 22 members and guests present for dinner and 39 for the business and educational meeting.

There were no new member applications. Communications consisted of a copy of minutes of Midwest Regional meeting held at South Bend.

Frank Menniges, chairman of the banquet committee, reported a letter had been mailed to the membership giving the details of the May 6 Banquet.

Andy Julius reported the Chairman of the Midwest Regional Council had sent him a letter concerning the educational session for 1962 convention. **Howard McAleer** has been selected as Exposition Chairman for the Convention here in 1964.

Ken Robins introduced **Douglas Nelson,** researcher at Monsanto Chemical, who talked on bright dipping of aluminum. His talk was illustrated by diagrams and sketches. A lively question and answer session followed. A rising vote of thanks was given Mr. Nelson for his enlightening speech.

Meeting adjourned at 10:00 p.m.

Ward Kelly
Secretary

SPRINGFIELD

Pettit Talks on Metal Etching

The Springfield Branch met at Wayside Restaurant, for the November 28 meeting. **Ralph E. Pettit** and **Al Wilde** of the Diversey Company hosted the cocktail party for the Branch, until dinner was announced at 7 p.m.

After dinner, there was a short business meeting. **Robert Girard** suggested a minute of silent prayer for **Anthony S. Horta,** a long-time member of the Branch, who died during the previous week—on Sunday, November 20.

Two new members were elected into the Branch.

Mr. Girard, as technical chairman for the evening, spoke on behalf of the Springfield Branch members in saying 'Thank You' to Ralph E. Pettit and Al Wilde for the pre-meeting gathering. Bob gave the background of Mr. Pettit, technical advisor of the Metal Industry Department at Diversey Corporation of Chicago, Illinois, in introducing him as the speaker.

Mr. Pettit spoke on "Metal Etching—Functional and Decorative." He explained that chemical milling was but another process of removing metal from a specific area, and its purpose definitely was not to put mechanical milling out of business. He stressed that a removal rate of metal of 1 ml per minute was the goal, and the process has the distinct advantage of etching multiple surfaces simultaneously and on a number of parts. Taper can be accomplished on either one side or on both, and to various degrees. Dimensions can be held to very close tolerances. There

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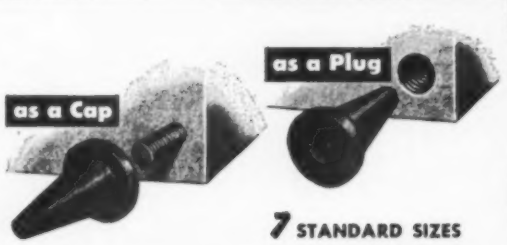

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seemed no end to the designs and color arrangements of patterns and pictures that Mr. Pettit showed in the colored slides, and on the elaborate display cases that were all around the room.

All in all, this November meeting was one of the finest and highest in attendance that the Springfield Branch has enjoyed for many, many months. Mr. Pettit and his subject are to be highly recommended, both for speaker quality and subject interest.

Henry L. Heissfeld
Secretary

WATERBURY
Korbelak Discusses Precious Metal Plating

The Waterbury Branch held its regular monthly meeting at the Roger Smith Hotel on Thursday, December 8, 1960. Vice President **Louis Porretti** conducted the short business meeting. Three new members received certificates.

A discussion of the forthcoming Interim Meeting was held and action will be taken to name the Old Timer who will represent Waterbury at the "Old Timers Night" to be held in conjunction with this meeting. **Perry Sloane** gave a progress report on the program to supply experienced platers as guest teachers in local high school chemistry courses. It appears as if this service will be used by several local communities.

Clarence Foster, technical chairman, introduced the guest speaker, **A. Korbelak** of Sel-Rex, Inc., who spoke on "Jet Age Precious Metal Plating." The talk dealt with the modern aspects of precious metal plating and Mr. Korbelak showed slides and lots of parts plated with precious metals. After the official presentation Mr. Korbelak described some of the companies and places he visited on his trip to Australia and Japan. It was an excellent talk.

January's program features an outstanding authority in the field of electroplating. **Dr. John O'M. Bockris** will speak on Atomic and Ionic Movements in Electrodes. The meeting will be held on January 12, 1961.

F. A. Schneiders

BRANCH EDUCATION

AT PORTLAND

The electroplating course at the Portland (Oregon) State College, which is cooperatively sponsored by the Portland Branch of the AES and the Oregon State System of Higher Education, convened for its first class of the current semester on January 7. The method of conducting this course and its curriculum were described in an article by A. Everett Cook on pages 814–18 in the July 1960 issue of PLATING.

Ed Elkins

PLATING MAGAZINE invites AES Branches to furnish news for publication in PLATING concerning electroplating courses sponsored.

ELECTROPLATING COURSES

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CLEVELAND, OHIO—Max S. Hayes Trade School
H. Pochapsky Instructor
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INDIANAPOLIS, IND.—Purdue University Extension
Dr. A. M. Max, Instructor
16-wk. course—Fee: $45

MONTREAL, QUE.—Polytechnique Institute
Dr. Andre Hone, Instructor
3-year course—Fee: $50

NEWARK, N. J.—Plants and Laboratories in Area
F. J. LaManna, Instructor
14-wk. course—Fee: $25

NEW HAVEN, CONN.—New Haven College
L. J. Durney, Instructor
15-wk. course—Fee: $50

PHILADELPHIA, PA.—Temple University Technical Institute
Dr. S. Heiman, Instructor
4 Semesters, each 16 wks.—Fee: $37 per Sem.

PORTLAND, OREGON—Portland State College
Dr. J. R. Mickelsen, Instructor
10-wk. course —Fee: $10

PROVIDENCE, R. I.—Central Senior High School
Omer Jette, J. Fogarty, J.Castriotta Instructors
2-year course—Fee: None

ST. LOUIS, MO.—Hadley Technical H. S.
Dr. Otto C. Klein, Instructor
16-wk. course—Fee: $10

SAN ANTONIO, TEX.—Trinity University
W. P. Wisdom, Instructor
18-wk. course—Fee: $10

SAN FRANCISCO, CAL.—Cubberly H. S., Palo Alto
William Ferry, Instructor
24-wk. course—Fee: $3 per 12wk semester

SOUTH BEND, IND.
Dr. H. J. Wiesner, Instructor

SPRINGFIELD, MASS.—Chicopee Vocational H. S.
R. J. Girard and E. F. Koetsch Jr., Instructors
Two 12-wk. courses—Fee: None

TORONTO, ONT.—Central Technical High School
R. H. Clark, Instructor
22-wk. course—Fee: $15—non-res.
$ 5—city res.

VANCOUVER, B. C.—Vancouver Technical School
Walter Kellerman, Instructor
6-mo. course—Fee: $15

EVANSVILLE, IND.—Joseph B. Kushner Electroplating School
Joseph B. Kushner, Instructor, 621 S. Norman Ave.
4 mos. to 1 yr. correspondence courses—Fee: $150

SANTE FE SPRINGS, CAL.—Weiner Electroplating School
Milton Weiner, Instructor, 12631 Imperial Highway
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The above listings were correct so far as could be ascertained at press time. Prospective students are urged to verify courses and fees prior to making definite plans.

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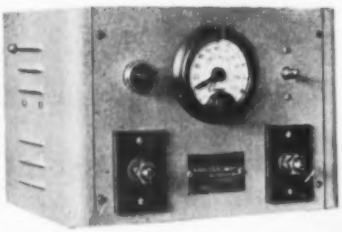

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FUTURE MEETINGS

AMERICAN ELECTROPLATERS' SOCIETY

February 3-4, 1961—**Third Annual Dixie Regional Technical Session,** Hotel Roanoke, Roanoke, Virginia. Blue Ridge Host Branch.

February 4, 1961—**New York Branch Annual Educational Session and Banquet,** Hotel Statler-Hilton, New York, N. Y.

February 4, 1961—**Saginaw Valley Branch Annual Educational Session and Banquet,** Frankenmuth, Michigan.

February 4, 1961—**Seventh Annual Tri-State Regional Meeting,** Deshler-Hilton Hotel, Columbus, Ohio.

February 10, 1961—**Executive Board Meeting,** Statler Hotel, Hartford, Conn.

February 10, 1961—**Joint Evening Meeting, AES Executive Board and MFSA Board of Trustees,** Statler Hotel, Hartford, Conn.

February 11, 1961—**Eighth Interim Meeting,** Supreme Society, Statler Hotel, Hartford, Connecticut. New England Regional Council, Host.

February 11, 1961—**"Old Timers Night," AES New England Regional Council,** Saengerbund Hall, Hartford, Conn.

February 18, 1961—**San Francisco Educational Sessions and Dinner-Dance,** Jack Tar Hotel, San Francisco, Calif.

March 3-4, 1961—**Philadelphia Branch Annual Technical Session and Banquet,** Benjamin Franklin Hotel, Philadelphia, Pa.

March 4, 1961—**Dayton Branch 15th Annual Educational Session and Dinner Dance,** Biltmore Hotel, Dayton, Ohio.

March 11, 1961—**Rockford Branch, Annual Meeting,** Faust Hotel, Rockford, Ill.

March 28, 1961—**Toronto Branch, "First Symposium on Metal Finishing,"** Seaway Hotel, Toronto, Ontario, Canada.

April 6-7, 1961—**Editorial Board Meeting,** Statler-Hilton Hotel, Detroit, Michigan.

April 8, 1961—**Los Angeles Branch,** Annual Educational Session and Dinner Dance.

April 14-15, 1961—**Executive Board Meeting,** National Headquarters, Newark, N. J.

April 15, 1961—**Baltimore-Washington Branch,** Annual Banquet and Dance. Presentation of the "Order of the Pot," Baltimore, Maryland.

April 22, 1961—**Twenty-Second Annual New England Regional Meeting,** Hotel Statler, Hartford, Conn.

April 24-25, 1961—**AES Research Conference,** Bell Telephone Laboratories, Murray Hill, N. J.

April 26, 1961—**Research Committee Meeting,** National Headquarters, Newark N. J.

April 29, 1961—**Milwaukee Branch Annual Educational Session and Banquet,** Schroeder Hotel, Milwaukee, Wis.

May 2, 1961—**Central Michigan Branch Annual Educational Session and Banquet,** Hotel Hayes, Jackson, Michigan.

May 5-6, 1961—**Rochester Branch Fiftieth Anniversary Celebration Concurrently with Empire State Regional Annual Meeting,** Hotel Manger, Rochester, N. Y.

May 6, 1961—**St. Louis Branch,** Annual Banquet, Sheraton-Jefferson Hotel, St. Louis, Mo.

June 18-23, 1961—**48th AES Annual Convention,** Hotel Statler, Boston, Mass.

January 13, 1962—**Ninth Interim Meeting, Supreme Society,** Hotel Marott, Indianapolis, Ind.

June 25-28, 1962—**49th AES Annual Convention,** Schroeder Hotel, Milwaukee, Wis. Sponsorship Midwest Regional Council.

June 24-27, 1963—**50th AES Annual Convention,** Ambassador Hotel, Atlantic City. N. J. Sponsorship Newark Branch.

June 15-18, 1964—**51st AES Annual Convention,** Sheraton-Jefferson Hotel, St. Louis, Missouri.

June 16-18, 1964—**Sixth Industrial Finishing Exposition,** St. Louis, Missouri.

June 28-July 1, 1965—**52nd AES Annual Convention,** Statler Hotel, New York, N. Y.

June 1966—**53rd AES Annual Convention,** Hotel Fontainebleau, Miami, Florida. Dixie Regional Council, Sponsor. Southeastern Branch, Host.

INTERSOCIETY

March 20-24, 1961—**American Society for Metals, 12th Western Metal Congress and Exposition,** Pan-Pacific Auditorium, Los Angeles, Calif.

Apr. 30-May 4, 1961—**The Electrochemical Society, Spring Meeting,** Claypool Hotel, Indianapolis, Ind.

May 2-4, 1961—**16th Purdue Industrial Waste Conference,** Purdue Memorial Center, Purdue University, Lafayette, Ind.

May 22-26, 1961—**American Society of Tool and Manufacturing Engineers,** Engineering Conference and Exhibit, New York, N. Y.

June 16-19, 1961—**National Association of Metal Finishers,** Annual Convention, Statler-Hilton Hotel, Boston, Mass.

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